Sustainable exploitation of bioactive components from the Black Sea Area traditional foods

D 6.2. (part 7) BaSeFood Newsletter
Special Issue 7, October 2012
(Posters presented at TFI-2012 Congress)

Francesca Danesi, L. Filippo D'Antuono

Contributors of compilation:
Francesca Danesi, Federico Ferioli, Elisa Giambanelli, Federica Pasini (UNIBO)

Contributors of contents:
All the Authors of posters presented at TFI-2012 and included in this deliverable - see also TFI-2012 Book of Abstracts

Due date of deliverable: [additional, with respect to contract]
Actual submission date (first draft): [October 2012]
Final submission date: [October2012]
Start date of project: 1 April 2009
Duration: 43 months
Organisation name of lead contractor for this deliverable: [UNIBO - P1]
Dissemination level: PU ☐ PP ☐ RE ☐ CO ☐
Alma Mater Studiorum, University of Bologna

BaSeFood Newsletter

Special issue n.7, October 2012

Posters presented at:

TRADITIONAL FOOD INTERNATIONAL 2012 (TFI-2012)

Traditional foods: from culture, ecology and diversity, to human health and potential for exploitation

including

THE STREET FOOD SEMINAR

An international forum on street food

aspects and perspectives

Cesena, Italy

OCTOBER 4-5, 2012

Editors: Francesca Danesi, Federico Ferioli, Elisa Giambanelli, Federica Pasini, Luigi Filippo D’Antuono
Alma Mater Studiorum, University of Bologna

BaSeFood Newsletter

Special issue n.7, October 2012

Posters presented at:

TRADITIONAL FOOD INTERNATIONAL 2012 (TFI-2012)

*Traditional foods: from culture, ecology and diversity, to human health and potential for exploitation*

including

THE STREET FOOD SEMINAR

An international forum on street food – aspects and perspectives

Cesena, Italy

OCTOBER 4-5, 2012

Editors: Francesca Danesi, Federico Ferioli, Elisa Giambanelli, Federica Pasini, Luigi Filippo D’Antuono
This is a special issue of the BaSeFood newsletter, devoted to the presentation of final dissemination events, and including most posters presented at the Congress: Traditional Food International (www.tfi-2012.com) held in Cesena, Italy, October 4-5, 2012.

Organisation and management

6th Coordination and Project management board meeting

BaSeFood ends on October 31, 2012. The last project’s meeting was forecasted to be held at the University of Bologna, Cesena campus. It has been organised in order to combine it with dissemination events where the project’s results could be adequately illustrated and discussed. The structure of final meeting was therefore the following:

- **October 3:** Project management board, Food Science University Campus, Cesena
- **October 4-5:** Presentation of the scientific results at the International Congress: Traditional Food International (TFI-2012), held at Teatro Verdi, Cesena. TFI-2012 was organised by the BaSeFood project.
- **October 6:** Dissemination about Black sea region traditional foods within the 7th Street food festival, an event organised by Confesercenti di Cesena, to which BaSeFood participated to disseminate its activities and promote Black Sea region traditional foods. The scientific link between TFI-2012 and the street food festival was represented by the Street food seminar, organised as a final session of TFI-2012.

Project management board meeting

The project management board meeting was devoted to make the point of the situation of the activities carried out during the last months, to summarise the situation of deliverables still to be submitted and to illustrate the guidelines for final reporting. BaSeFood activities from March to October 2012 were mainly addressed at completing the tasks for which a time extension of the project was required:

- on place surveys of traditional food and food systems
- clinical and laboratory trials about the health effects of selected foods and plant compounds
- technological chain research about specific traditional foods.

The timing for final deliverables submission was further checked, with the final output that all the project’s activities can be concluded according to schedule. A time table for final reporting was agreed.

The participants at the Project management board meeting, Food Science Campus, Cesena
Traditional Food International Congress (TFI-2012)

Traditional Food International (TFI-2012) has been an international Congress organised by BaSeFood, in collaboration with Se.Rin:AR., as a dissemination event in concomitance with final BaSeFood meeting.

The Congress was opened by Matteo Marchi, representing the Cesena Municipality, prof Achille Franchini, Director of the Food Science Department at the Bologna University, and Isabelle van Borm, Scientific officer at the European Commission.

The Congress was aimed at being a forum, making the point of the present knowledge and research about traditional foods, including the public presentation of the highlights of BaSeFood results.

The Congress was held in the beautiful setting of the Teatro Verdi, in the Cesena city centre, Italy, on October 4-5, 2012.

The Congress was aimed at being a forum, making the point of the present knowledge and research about traditional foods, including the public presentation of the highlights of BaSeFood results.

The Congress was held in the beautiful setting of the Teatro Verdi, in the Cesena city centre, Italy, on October 4-5, 2012.

The Congress was aimed at being a forum, making the point of the present knowledge and research about traditional foods, including the public presentation of the highlights of BaSeFood results.

Prof. Timothy Johns, Mc. Gill University, Montreal, Canada, first TFI-2012 plenary invited speaker, chairing a session.

The Congress was opened by Matteo Marchi, representing the Cesena Municipality, prof Achille Franchini, Director of the Food Science Department at the Bologna University, and Isabelle van Borm, Scientific officer at the European Commission.

The Congress was attended by over 100 participants, 69 of which regularly registered.

The complete program of the meeting can be found at www.tfi-2012.com.

A book of abstracts including the summaries of all the oral presentations and posters was published with ISBN 978-88-902152-1-6, and is available upon request.

TFI-2012 was organised in three parts:

Main oral presentation sessions
Main oral presentations took place on October 4 and in the morning of October 5 and were given by:
- Internationally recognised invited speakers, giving plenary lectures on specific topics connected to several aspects of traditional foods research and exploitation.
- the coordinators of recently funded or ongoing international traditional food research projects
- BaSeFood coordinator, work package and task leaders, publicly illustrating the highlight of BaSeFood R&D achievements.

Most of the oral presentations are uploaded in the BaSeFood web site at: http://www.basefood-fp7.eu/dissemination/tfi_2012_congress

Poster session
The poster session, open to both participants, was shortly presented orally.

BaSeFood and external contributions, was organised in a conventional poster show, and in an “oral poster” session, held on Friday October 5 afternoon, during which eight selected posters were shortly presented orally.

101 posters were presented, representing over 170 authors.

The copies of posters from authors who authorised their publications are the main subject of this newsletter

Street Food seminar session
The Street food seminar was held in the meeting room Dradi Maraldi, of the Fondazione Cassa di Risparmio di Cesena, on Friday October 5, from 16.30 to 19.00. It was an integral part of TFI-2012, organised in collaboration with Confesercenti di Cesena, the organisers of the 7th street food festival. It was aimed to be a scientific link between the TFI-212 event and the Street food festival itself, to be a first international forum about street food aspects, and to find the relations between traditional and street foods.

The “Festival Internazionale del cibo di strada” http://www.cibodistrada.com/ (Street food international festival) takes place in the Cesena city centre every two years. In 2012, the 7th edition took place, on October 5-7.

As previously illustrated BaSeFood interacted with the Street food festival organisers in order to:
- organise the Street food seminar session of TFI-2012;
- disseminate BaSeFood activities
- promote the Black sea region traditional foods within the Street food festival.

The Street food festival was opened Friday 5, at 19.00, with the participation of local authorities and L. Filippo D’Antuono, BaSeFood coordinator.

The TFI-2012 posters on topics related to street foods and traditional foods of the Black Sea area were immediately moved to a stand at the Street food festival itself, after the poster session of TFI-2012, where they remained on display until Sunday 7.

Dissemination at the 7th Street food festival, Friday 5 and Saturday 6 October, Cesena city centre

The Congress was aimed at being a forum, making the point of the present knowledge and research about traditional foods, including the public presentation of the highlights of BaSeFood results.

The Congress was opened by Matteo Marchi, representing the Cesena Municipality, prof Achille Franchini, Director of the Food Science Department at the Bologna University, and Isabelle van Borm, Scientific officer at the European Commission.

The Congress was attended by over 100 participants, 69 of which regularly registered.

The complete program of the meeting can be found at www.tfi-2012.com.

A book of abstracts including the summaries of all the oral presentations and posters was published with ISBN 978-88-902152-1-6, and is available upon request.

TFI-2012 was organised in three parts:

Main oral presentation sessions
Main oral presentations took place on October 4 and in the morning of October 5 and were given by:
- Internationally recognised invited speakers, giving plenary lectures on specific topics connected to several aspects of traditional foods research and exploitation.
- the coordinators of recently funded or ongoing international traditional food research projects
- BaSeFood coordinator, work package and task leaders, publicly illustrating the highlight of BaSeFood R&D achievements.

Most of the oral presentations are uploaded in the BaSeFood web site at: http://www.basefood-fp7.eu/dissemination/tfi_2012_congress

Poster session
The poster session, open to both participants, was shortly presented orally.

BaSeFood and external contributions, was organised in a conventional poster show, and in an “oral poster” session, held on Friday October 5 afternoon, during which eight selected posters were shortly presented orally.

101 posters were presented, representing over 170 authors.

The copies of posters from authors who authorised their publications are the main subject of this newsletter

Street Food seminar session
The Street food seminar was held in the meeting room Dradi Maraldi, of the Fondazione Cassa di Risparmio di Cesena, on Friday October 5, from 16.30 to 19.00. It was an integral part of TFI-2012, organised in collaboration with Confesercenti di Cesena, the organisers of the 7th street food festival. It was aimed to be a scientific link between the TFI-212 event and the Street food festival itself, to be a first international forum about street food aspects, and to find the relations between traditional and street foods.

The “Festival Internazionale del cibo di strada” http://www.cibodistrada.com/ (Street food international festival) takes place in the Cesena city centre every two years. In 2012, the 7th edition took place, on October 5-7.

As previously illustrated BaSeFood interacted with the Street food festival organisers in order to:
- organise the Street food seminar session of TFI-2012;
- disseminate BaSeFood activities
- promote the Black sea region traditional foods within the Street food festival.

The Street food festival was opened Friday 5, at 19.00, with the participation of local authorities and L. Filippo D’Antuono, BaSeFood coordinator.

The TFI-2012 posters on topics related to street foods and traditional foods of the Black Sea area were immediately moved to a stand at the Street food festival itself, after the poster session of TFI-2012, where they remained on display until Sunday 7.

Dissemination at the 7th Street food festival, Friday 5 and Saturday 6 October, Cesena city centre

The “Festival Internazionale del cibo di strada” http://www.cibodistrada.com/ (Street food international festival) takes place in the Cesena city centre every two years. In 2012, the 7th edition took place, on October 5-7.

As previously illustrated BaSeFood interacted with the Street food festival organisers in order to:
- organise the Street food seminar session of TFI-2012;
- disseminate BaSeFood activities
- promote the Black sea region traditional foods within the Street food festival.

The Street food festival was opened Friday 5, at 19.00, with the participation of local authorities and L. Filippo D’Antuono, BaSeFood coordinator.

The TFI-2012 posters on topics related to street foods and traditional foods of the Black Sea area were immediately moved to a stand at the Street food festival itself, after the poster session of TFI-2012, where they remained on display until Sunday 7.
On Saturday 6 October, at 10.30, BaSeFood coordinator gave a presentation, in Italian, to the street food festival participants, with the title: Gli alimenti tradizionali dell’area del Mar Nero e cenni sui cibi di strada (Traditional foods of the Black Sea area, with references to street foods). A copy of this presentation is uploaded in the BaSeFood web site at: http://www.basefood-fp7.eu/dissemination/events_organised_within_basefood_activities

The attendance was not very high because people were attracted by the food stands and nice full sunny day did not allow a good vision of the slide presentation. Therefore the presentation was repeated in the afternoon, in a meeting room of Bar Roma, during the atelier about Russian shashliky preparation, held by a Russian cook and the gastronomic journalist Vittorio Castellani, alias Chef Kumalé.

The atelier of a Russian chef and Chef Kumalé, during which the traditional foods of the Black sea area and the BaSeFood project were illustrated by BaSeFood coordinator Gianpiero Giordani, for the Street Food Seminar, and a link to:

Traditional Food International (TFI-2012)

Traditional foods: from culture, ecology and diversity, to human health and potential for exploitation including

the Street Food Seminar

An international forum on street food – aspects and perspectives

was jointly organised by

L. Filippo D’Antuono
Elisa Giambanelli
Federico Ferioli
Federica Pasini
Cinzia Tasso

Fabrizio Abbondanza
Luigia Binetti
Nadia Molinari
Andrea Mangelli

Gianpiero Giordani, for the Street Food Seminar, and a link to:
ANCIENT MALOIDEAE AND TRADITIONAL PRODUCTS IN THE REGGIO EMILIA APENNINES (NORTHERN ITALY)

Cristina Biggiani1,2, Alberto Baroni2, Cristina Barbieri2, Samantha Farnaldu3, Serena Anna Imazio1,2, Giuseppe Montecucco1,2
1 Department of Life Science (Agro-Food Science), University of Modena and Reggio Emilia, Italy. E-mail: cristina.biggiani@unimore.it
2 Bioest-Sanitas, University of Modena and Reggio Emilia, Italy.

Introduction
On the hills and mountains of Reggio Emilia province, ancient local apple and pear cultivars ( cvs) are still available. They were traditionally processed to: † preserve fruits, † supplement and differentiate diets, † provide a sweetener (refined sugar replacement) for local recipes. Some of these traditional products are currently rediscovered. An example is the valorization of ‘Savaret’, a jam obtained by cooking and concentrating juice and slices of old pomes. Other (hier dried fruits ‘ghelp’ or ‘grispelli’) are not prepared anymore.

An investigation on pear and apple cvs and their uses has started within the project “Characterization and evaluation of local varieties of fruit trees in the territory of Reggio Emilia” with the following goals: † gathering material on the traditional use of Reggio Emilia Maloideae (Pyrus) cvs; † verifying dilution and condition of the trees; † characterizing the fruit and the products derived from them.

Material and methods
Since 2010, the following activities were carried out: † surveys on the presence and distribution of Reggio Emilia province; † analysis of historical documents and collection of information from farmers, manufacturers, and local experts; † inventory of cvs and trees and ‘on farm’ characterization; † fruit sampling; † pomological characterization and composition analysis (“Brix, titratable acidity, HPLC analysis of the main sugars and organic acids, and total polyphenols, carried out by Poln-Cicladhes, reagent).”

Results
Trees. Surveys showed the presence of sparse plants of AvaL, Nobile, and Spaler, sometimes very old and difficult to harvest due to their big size. Recently new small orchards have been established.

Cultivars. Late ripening cvs were employed for ‘savarett’ preparation and other traditional recipes in order to preserve fruits for winter consume. Different pear and apple cvs are the ingredients of ‘savarett’, depending on the area of production and fruit availability. The main cvs are pear Spaler for juice production and pear Nobile (Barabini) for the slices that give consistency to the jam. Sometimes other pear (Aval, Tremendous, Frond) cvs and apple (Campanino, Ferro, Limone, Rosa, Rosoro) cvs are used.

Fruit characteristics. Pulp firmness was higher for Nobile and Aval than Spaler. Among the apples, Rosona showed the lowest pulp firmness. Pear Spaler and all the Nobile accessions were characterized by high soluble solid content and by different titratable acidity, lower for the latter, thus contributing to their sharp sensory sweetness.

Fructose, a sugar with high sweetening power, was higher for Spaler than all the other cvs, whereas glucose and sucrose showed lower concentrations. Fructose is the most abundant sugar for all the apple cvs; glucose content for Rosa was higher than all the other cvs, while sucrose was the lowest value. Campanino showed a citric acid/sucrose ratio much higher than the other apple cvs.

Total phenolic content for Aval and Spaler was almost double that of all the Nobile accessions, while among the apples, Rosone and Rosa showed the highest values.

Conclusions
The investigation evidenced: † loss or survival of old tradition based on fruits, † changes in time and space of fruit varieties and layoffs in the traditional recipes, † and the potential for the exploitation of some traditional products and for a sustainable safeguard of threatened cultivars.

Research funded by the Foundation Cassa di Risparmio “Pietro Manodori” - Reggio Emilia and Provincia di Reggio Emilia.
Cornelian cherry in the Black Sea area and Italy: local knowledge, uses and potential for health promotion

Cristina Bigianni - Department of Life Science, University of Modena and Reggio Emilia, Italy
L. Filippo D'Antuono - Department of Agri-Food Science and Technology, Cesena, University of Bologna, Italy
Katerina Fedoseva - Odessa National Academy of Food Technology, Odessa, Ukraine
Nadiya Boyko, Maria Mudyk - Uzhhorod National University, Uzhhorod, Ukraine
Alexander Kolesov - Moscow State University of Food Production, Moscow, Russia Federation
Mariam Jerzade - Elkana, Biological farming association, Tbilisi, Georgia

BACKGROUND
Cornelian cherry (Cornus mas L.) belongs to the wide group of multipurpose woody species with fruit of nutritional and medicinal interest. Its wide natural distribution and the long history of folk use have allowed the conservation of genetic resources and traditional systems of fruit processing in many countries, but the current level of knowledge of its potential and the exploitation of the fruit is very different in West Europe, where cornelian cherry is a less known fruit almost forgotten, with respect to the Black Sea area, were it is well known, widely used and marketed. A survey on traditional products and local knowledge in the Black sea area and Italy has been carried out in order to highlight similarities, differences and trends from East to West, pointing out the potential of folk knowledge and use of cornelian cherry for local communities and human welfare.

Area of investigation: Ukraine, Russia, Georgia, and Italy (reference Country for Western Europe)

Methods
- Deep review of literature on a worldwide basis
- On site surveys: identification of key respondents (local agricultural extension services, agricultural unions and associations, stakeholders); interviews (generally face-to-face, in deep interviews)

Black Sea area
The tradition of fruit use and the attention for the exploitation of cornelian cherry is strong in Ukraine (Carpathian region, Crimea), Russia (estimated about 20,000 exploitable plants), Italy (mainly in Ansalina, about 150,000 plants). Harvest of wild stands, growing of some orchards, selection of cultivars with improved fruit size and quality confirm the interest in this species. Fruits are sold in markets and on the streets, processed at home and in small firms.

Past and present

Food uses and recipes
Cornelian cherries have been traditionally processed with similar methods in Eastern Europe and Italy. However, the variability and the current availability of fruits and products are different.

1. Dried cornelian cherries
   - at home level or at semi-industrial level
   - sold to firms producing food products or extracts
   - rehydrated and used in compotes or for herbal teas
   - ingredients of soups, gruels (e.g., the Ukrainian kulvar)
2. Concentrated juice and pulps
   - jams without sugar (e.g., the Ukrainian kulvar) and sour souces Black sea area, Italy
   - commercial jams: sealed jars allow shorter boiling
3. Dried pulps and juices
   - the thin layers layers can be preserved for months
   - consumed as they are or as ingredients of food preparation
   - alternative to the use of dry fruits
   - considered also as natural remedy

4. Addition of sugar
   - Compotes - generally, pure cornelian cherry compotes are prepared with fresh fruits and sealed in glass jars: in the past also dried fruits were used. Consumed as soft drinks
   - Pulps preserved in sugar - eaten as it is, used as a sweetener, or, more frequently, as a medicine
   - Fruits in concentrated sugar syrup - Fruits are sealed in jars with sugar syrup of various concentration: variant: fruits preserved and filtered, in order to obtain only the syrup
   - Fruits in concentrated sugar syrup and wine - Fruits are boiled in white wine and sugar (Italy; Trentino)
   - Jams - the fruits are boiled with sugar: currently manufactured by artisan or semi-industrial producers

5. Addition of salt: fruits in brine similarly to olives (Italy)
6. Fermentation: spirits

Folk medicine and perception of health properties
In the Black Sea area the use of cornelian cherry is associated with the popular perception of health promoting properties (disinfectant, anti-diarrhoea, anti-inflammatory, vessel-protective, especially against haemorrhoids) whereas in Italy this knowledge has been almost lost in the last two generations.

Conclusions
In the Black Sea area cornelian cherry is an important component of the traditions; its fresh fruits and products are diffusely marketed and there is awareness of the beneficial effects of its consumption. In Italy despite well documented tradition of use, cornelian cherry is currently under-utilised, but there is a good potential for exploitation and the proposal of new products (juices, drinks) fitting better with present day food preferences and life style.

Acknowledgements
This research has received funding from the European Community's Seventh Framework Program (FP7/2007-2013) under grant agreement n. 217116, project BaSaFood.
The concepts underlying traditional fruit product utilisation: an intercultural comparison between Italian and Black Sea region

Cristina Bigoni - Department of Life Science, University of Modena and Reggio Emilia, Italy
L. Filippo D’Antuono - Department of Agri-Food Science and Technology, Cesena, University of Bologna, Italy
Katerina Fedoseva - Odessa National Academy of Food Technology, Odessa, Ukraine
Marian Berzina - Elita, Biological farming association, Tbilisi, Georgia
Iordanca Alexieva - University of Food Technology, Plovdiv, Bulgaria

BACKGROUND
The need to preserve and extend the availability of perishable, fleshy fruits and obtain food for direct consumption and processing has generated in the world a wide range of traditional products characterized by peculiar sensory quality and expected functions and based on different raw material and home processing systems.

The traditional diet of the rural communities in the Black Sea area and in the Mediterranean Basin is characterized by several of these fruit derivatives. The past and current situation in the Black Sea area and Italy, as reference country of the Mediterranean Basin, has been compared with the aim of finding common points and differences in raw material, way of processing and uses.

Area of investigation: Bulgaria, Georgia, Ukraine, Armenia, in the Black Sea region; Marche, Emilia Romagna, Tuscany in Italy.

Methods: consultation of historical and recent documentation on ingredients, processing systems and uses; on site surveys: interviews to growers, manufacturers and local experts.

Results
Within each category of product (direct consumption or seasoning; liquid or solid; sweet or sour) similar raw material and processing systems are used in the Black Sea region and in Italy.

The traditional ways of fruit preservation are: a) reduction of water content - Correspondences between recipes of the two areas have been individuated for the concentrated juices ‘pekmez’ in the Black Sea area and ‘saba’ in Italy; ‘pelamush’ and the Italian ‘sughi’, both produced with flour and concentrated juices of grapes (Italy) and other fruits (Black sea area), ‘lekar’ (long boiling of fruit juice and slices) and the Italian ‘savor’ and ‘savourret’; the verjus ‘isirmi’ (Georgia) and ‘agresto’ (Italy) condensed juice of unripe grapes mainly used as a substitute of vinegar; dried fruits (whole or slices) b) addition of sugar or salt; c) fermentation.

Fruit derivatives peculiar of the Black Sea region:

- Fruit leathers, churkhela

There is no known preparation equal to fruit leathers and churkhela in Italy. Similar to fruit leathers were the ‘bricks’ of dried fruit juice to cut in slices of Martvili region (no longer prepared).

- The preparation of white mulberry fruit leather, Georgia

- Fruit leathers, Enrevan market (Armenia)

In Bulgaria, Georgia, Ukraine, Armenia the traditions are well preserved and widely diffused. In Italy some fruits derivatives (saba, sughi, savor, savoret) are produced also in small firms and marketed. Other traditions have been lost or only recently resumed (agresto).

Conclusions
The current richness of traditional products is higher in the Eastern areas than in Italy, mostly as a consequence of changed lifestyle and economic conditions which have allowed different levels of preservation of these traditions or pushed to their abandonment and to innovation. Migration, interest for the differentiation of the diet and for the health properties of the fruits may open new perspectives of exchange of knowledge and exploitation of products.

Acknowledgements. This research has received funding from the European Community’s Seventh Framework Program (FP7/2007- 2013) under grant agreement n. 227118, project BaseFood.
Black briony (*Tamus communis* L.) in Italy: traditional uses and foods

L. Filippo D’Antuono - Department of Agri-Food science and technology, Cesena, University of Bologna, Italy

**BACKGROUND**

During spring, the young sprouts of several wild plants are used as food resources. In the past, there were a seasonal component of diets of countryside people, on the Framework of a careful exploitation of all the available natural resources. Presently some of them are being recovered as local specialities.

The number of species is quite high, some of which are combined with other wild greens. From the thorough review of popular knowledge and surveys in local contexts, the main spring sprouts employed are the following:

- Wild asparagus (*Asparagus acutifolius L.*)
- Black briony (*Tamus communis* L.)
- Greener or (*Solinax aspera* L.)
- Butcher’s broom (*Ruscus aculeatus* L.)
- Wild hops (*Humulus lupulus* L.)
- Traveller’s joy (*Clematis vitalba* L.)
- Blackberries (*Rubus sp.*)

The common characteristics of these plants from a food utilization perspective, is that only the very young sprouts are used, since aged sprouts are not edible, becoming fibrous, or spiny, or even toxic, in some species. Black briony in Italy are grown broadly in Liguria were adopted as case studies, for their local significance in some contexts. This contribution reports some findings on Black briony in Italy.

**Tamus communis** (*Dioscorides*) is a climbing vine growing in forest margins, hedges and clearings in sub-Mediterranean vegetation types. It is a typical geophyte, whose aerial parts die every year and regenerate in spring from the big tubers; spring sprouts of mature plants are very vigorous. The plant, except young sprouts, is toxic because of asparagin and oxalic acid, of which the fruits are particularly rich. The tuber has been studied for its anti-inflammatory properties and as a potential source of diosgenin. The plant is rather popular in some areas as a potent external remedy for traumas and distonans, having, however, a strong skin-irritating side effect. The sprouts are very popular ingredients of soups and side dishes of most courses in central Italy. Their use is also reported for northwestern France. Documented cases of toxicity were not reported.

**An on-site investigation**

On site surveys were carried out in the area of the Tolfa mountains, in the province of Rome (1), central Italy.

Local respondents were interviewed about all aspects connected to their knowledge and uses of black briony.

The Tolfa mountains are a relatively low altitude volcanic range (max 633 m). The western slopes directly face the Tyrrhenian sea.

The climate is basically Mediterranean, with the consequent typical flora. However, local conditions and frequent thermal inversion determine the presence of plant communities more typical of higher altitudes, such as relief beach forests.

Land use is presently based mainly on wild range cattle and sheep breeding. In the past, logging was extensively practiced, mainly for the charcoal production. Local people retain a strong link and knowledge of the environment, and the exploitation of natural resources, like wild plants, mushrooms, game animals and sweet water fauna is still practised.

**Exploitation and harvest**

Black briony is particularly abundant in the clearings generated by periodic forest cuttings. In these conditions, bigger and more numerous sprouts are reported to be produced. This fact could be attributed to the higher amount of available light, lower competition from woody vegetation and the mineralization of some organic matter, which increases soil nutrient availability.

A close relation between spring rainfall and sprout production is consistently reported. Attempts of cultivation at home level were carried out, by tuber transplanting. Seeds germinate very slowly; the plant has long initial juveniles phase with slow tuber growth and too small sprouts for exploitation. The sprouts are picked at variable length, but only the tops are then used for cooking. The sprouts are commonly found on sale in the Çítulo market and also in the streets of Tolfa.

**Foods**

Black briony sprouts were one of the mixed wild greens exploited on place by shepherds and loggers, for easy to prepare foods. The main dish is the soup, called "suppe d’abbeccole", a variant of acquacotta; these are basically bread soups to which vegetables, meat, eggs and cheese are added according to availability and seasonality.

Another common way to use black briony sprouts is to to boil them in a pan and then use them simply with bread, or in omelettes or, more recently, as pasta seasoning. They are characterized by a pronounced bitter taste that makes them loved or rejected.

**Conclusions**

Black briony sprouts represent a perfect example of integrated use of natural resources for the nutrition of local communities. Their use confirms that greens did not represent side dishes in traditional use but of main courses with a common basis and variable composition according to availability.

Acknowledgements This research has received funding from the European Community’s Seventh Framework Program (FP7/2007-2013) under grant agreement n. 227158, project BeFood.
Local corn production and products in Italy: a significant example of chain approach to traditional food recovery from a non native plant

L. Filippo D’Antuono - Department of Agri-Food science and technology, Cesena, University of Bologna, Italy

Material and methods
Cases of local corn population recovery and exploitation schemes have been examined by means of literature revision and on-line documentation.

On site surveys, according to the usual scheme of BalsFood, were carried out in ten of the more significant areas of the Alpine region, the villages of Storno and Candarrazzo (1), and in the northern Apennines: Liguria (2), Toscana (3), Emilia Romagna (4) and Marche regions (5). The data will be compared with those being acquired in the Black Sea area region.

Past and present
By the beginning of the 20th centuries corn characterised the food habits of several areas of north and central Italy, with also severe drawbacks due to the lack of other dietary components. Nowadays it is being recovered as a well accepted component of varied diets based on tradition. The capture of the image on the rights mean: yesterday for need..... today in the awareness.

In the area of Storno (1) at Caldanazzo (1) the local population, similar to the cultivation of gene bank accessions. Production is presently Present production is around 1200 t per year.

In the Liguria region (2) at San Martino di Romito (2) the local Spin population was recovered. Production is presently Present production is about 100 t per year.

In the Marche region (5) at Ortello (5) the local population was recovered and selected by farmers. Production is presently Present production is about 100 t per year.

Growing
A range of growing systems were detected. Local farmers normally practice the selection of genotypes in order to maintain the character of local varieties. Generally plots are rather small, the bigger area being few hectares. Seeds growing is practised but not generalised. Rotation is however normally applied to control problems of Fusarium contamination that is tightly controlled.

Production chains
Whatever the scale, and the level of organisation, the exploitation of local varieties always includes the whole chain: growing, milling and flour packaging. Finished products, like biscuits, cakes or manufactured in some cases. The production of corn is often a promotion means of the village or local contexts but, except from local labels, no SOP or IGP denominations are present.

Processing
Milling is carried out with an extremely wide range of technologies and at very different scales. Stone milling is applied but not generalised, with hammer or cylinder mills often preferred. Also the flour grade (particle size and shape) is variable. Whole flour is produced but, in this case, short shelf life is assigned, because of the relevant fat content.

Conclusions
Corn represents a perfect case of a non native crop adapted by local populations. It is also a very significant proof that traditional foods were intrinsically variable, their preparation and strategies varying to local availability of ingredients.

Its present recovery is in most cases strictly connected to local food traditions, but is generally carried out with updated technologies, especially with respect to prevention of Fusarium toxins and shelf life definition. It represents a potentially useful example for situations where corn use is still very common, like in the Black sea area countries, to which the Italian situation is being critically compared.

Acknowledgements: This research has received funding from the European Community’s Seventh Framework Program under grant agreement n. 207458, project BalsFood.
Semi-domesticated herbs in the food traditions of the Romagna area

L. Filippo D’Antuono – Dept. of Agri-Food science and technology, Cesena, University of Bologna, Italy

Wild greens are used as foods in the traditions of almost whole Italy, with local differences due to the specific availability connected to climatic and soil conditions. They are mostly used in two ways: a) raw, in mixed salads, called insalatace or insalata; b) water cooked; in this case they can be eaten alone, as an addition (e.g. the purslane, from Liguria), with polenta, or as filling of various pies and pastries. The consumption of these preparations usually varies year round. Sometimes, some species are better individualized with respect to their uses, and also eaten alone as characteristic components of traditional dishes. Every row and then some species gain popularity and start to be more widespread, and cultivated: a recent well known case is represented by Rocket salad (Oenothera biennis L.) (DC). This contribution examines the uses of four species, with special regard to the area of Romagna, Italy.

Material and methods

Previous work has been revised and integrated with new references and interviews to stakeholders (seed firms, growers) and local people, in order to retrieve information on four plants of old traditional use in the Romagna area (1), that have been more and more subject to cultivation during last years. Russian thistle or barilla (Salsola soda L.), bladder campion (Silene vulgaris (Moench) Garcke), wild poppy (Papaver sp pl.), rampion (Campanula rapunculoides L.).

Production. Lach are cultivated in several regions, at high density; the whole plants are picked at a early stage, to avoid quality losses due to lignification. So far, production is limited to the greater Romagna area. The typical tool used to pick the plants is a special knife with a long handle. As mentioned earlier, the roots of the species can be used as a vegetable, boiled or sautéed along with other vegetables. The leaves are used as a salad, mixed with other vegetables, or cooked as a side dish. The flowers are also used as a garnish for salads and other dishes.

Acknowledgments. This research has received funding from the European Community’s Seventh Framework Program (FP7/2007-2013) under grant agreement n. 227118, project BaSeFood.
Hulled wheat uses and traditional foods, from the Mediterranean to Caucasus

L. Filippo D’Antuono - Dept. of Agri-Food science and Technology, Cesena, University of Bologna, Italy
Bičko Kočačiš, Osman Hayran - TUDAT University, Istanbul, Turkey
Irinka Aleksić - University of Food Technologies, Niš, Serbia
Katarina Fedoseva - Odessa Academy of Food Technology, Odessa, Ukraine. Nune Darbinyan - Ecoglobe, Erevan, Armenia.

Hulled wheats are Triticum taxa retaining the glumes after threshing, and other primitive traits such as rachis brittleness, long straw, low harvest index. The main species are einkorn (T. monococcum L.), emmer (T. dicoccum Schrank ex Thellung), spelt (T. aestivum L.) and spelt (T. aestivum L. Thell.). They have not been subject to breeding, except for growth in modern Europe and are almost disappeared from modern wheat growing. A recovery of their use took place in western Europe, starting from about 30 years ago. Detailed surveys were carried out in Italy, whereas less information is available in the Black Sea area. This work summarizes the Italian situation, and aims to establish the first comparative analyses with the Black Sea area countries, on the basis of cross country work started with the Black Sea area countries in the BaSeFood project.

Material and methods

In Italy, the situation of hulled wheat production and uses has been revised by a systematic survey with stakeholders. Information about the present situation and evolution of growing and demand was the main focus of this part. Local food uses and recipes have been registered in several local contexts, from Tuscany to Abruzzo regions. Joint survey missions have been carried out with BaSeFood Bulgarian and Turkish partners and with the Armenian sub-contractor. Information was received from Ukraine as well.

Past and present in Italy

Archaeological remains witness emmer and einkorn presence since prehistoric times. At the beginning of the 20th century their presence is still reported along the Apennine range, but later they were believed as extinct. During the eighties of last century, extensive surveys revealed that T. dicoccum and spelt T. monococcum were still cultivated in the mountains of central and south Italy (asterisks in the map).

Spring emmer populations were typical of a rather restricted area in central Italy. From Umbria to Molise regions, including the present PdO "Ferrai di Montesilvano" (1). Winter einkorn populations were represented by the well known, rather isolated population of Garfagnana, north-east Tuscany (in a GIS, 2), and some relics populations in central-south Apennines, from Alto Molise to Basilicata. All present emmer wheat cultivation is mainly practiced in central Italy (3) on about 4000 ha, using either selected strains from local populations or new bred varieties. The two PdO and GIS areas represent a minor share (less than 400 ha as a total).

Einkorn wheat is grown in few farms in the north and centre. Emmer wheat is called "farro" in Italian.

In Turkey, the Kastamonu and Sivas provinces (7) are well known hulled wheat growing areas, that have been visited during BaSeFood. Both einkorn and emmer wheat are present, with a probable prevalence of the first. The cultivating area, reported at about 10000 ha until few years ago, seems to be now substantially reduced. The presence of hulled wheats in the east has not been verified.

Production chains

In traditional contexts hulled wheats were used either as human food or animal feed, with prevalence of one use according to places, period and traditions. Human food was mainly for self consumption. Presently in Italy this use is almost disappeared and all emmer wheat crops, including the area of traditional uses, are commercial crops addressed at the market of local organic products.

In Bulgaria the situation is still unclear, but the grown einkorn seems to be similar to this situation, whereas emmer use and growing is till traditional. In Turkey and Armenia hulled wheats are grown both for self consumption or for marketing in local channels, with a still traditional utilisation pattern.

In Turkey the market is dominated by einkorn, in chain from growing to end products. The traditional crushed grain represents a very small share of the market. Peeled grain is more popular, since it is more suitable for the preparation of soups and salads. A range of "new" products like pasta, biscuits, cakes, breakfast cereals are nowadays manufactured.

In Italy the peculiarity is the preparation of bulgur, before glume removal. The grain (generally einkorn) is soaked in water with the glumes and air dried. After this procedure it is stoned milled to prepare bulgur.

Processing

Glume removal is the first step for use as human food. In tradition this was done by stone mills, that also cause the breaking of the kernel in pieces. This procedure is still in use in Bulgaria, Turkey and Armenia. Also in Italy, the traditional product of Montesilvano, is “furgiolo”, broken kernels from stone mill crushing. In Garfagnana the traditional product is pearled grain, that is now the most popular product in Italy as well. In Italy nowadays glume removal is independent on crushing or pearling and the two products are prepared from naked bulgur or pearled bulgur according to demand.

Glume removal is carried out in plants of different size. On small plants prevail in Turkey, medium size plants are present in Armenia, whereas in Italy there are few modern plants working for third parties. The primary product of processing is sold on local markets in Black Sea area countries, but only pushed in Italy.

Foods

The crushed grain was the basic human food product in all areas. It was, and still is, used to prepare dishes ranging from the consistency of a soup to that of a dense pudding, accompanied by a wide range of condiments, usually according to local availability and traditions. All of them are however variants of a basic preparation, in which the crushed grain or bulgur is water cooked. In Italy this was a classical dish that has been a staple during some periods in central Italy. In Garfagnana, however, the traditional product was pearled grain with which both soups, as for crushed grain, and cakes are prepared.

The documentation of several traditional recipes has been carried out. Several dishes are prepared in restaurants with emmer wheat in Turkey.

Conclusions

Hulled wheats are a case of drastic evolution of the product utilisation schemes, from traditional to present uses, involving almost all the stages of post harvest product life. They are also an example of a recovery of interest motivated by immaterial traits of raw materials. The transect of the exploitation schemes from Italy to the Caucasus suggests that potential for establishing a consolidated market oriented production does exist in the Black Sea area. This can also determine a positive trend to differentiation and co-existence of traditional and new productions, with positive effects on the conservation of local food products.

Acknowledgements. This research has received funding from the European Community’s Seventh Framework Programme under grant agreement N. 227118, project BaSeFood.
South-European *Brassica oleracea* leafy types: traditional food and uses in a cross-country, intercultural perspective

L. Filippo D’Asteuone, Elisa Giambonelli – Dept. of Agri-Food science and technology, Cesano, University of Bologna, Italy
Heleno S. Costa, Ana Sanches Silva, Tânia G. Albuquerque – Instituto Nacional de Saúde, Doctor Ricardo Jorge, Lisbon, Portugal
Bike Keşapoglu, Osman Heyran – 1C Yeditepe University, Istanbul, Turkey
Gordana Abadjieva – University of Food Technology, Plovdiv, Bulgaria
Marjan Jorjatze – Elkhon, Biological farming association, Tbilisi, Georgia

**Background**

Non-heading *Brassica oleracea* L. (esp. *napa-yellow OC*) include types referred to as kales or collards, but also the taxonomically similar kolokhoz, which leaves are often processed as food. They are considered to be the most primitive type of *B. oleracea*. Although they have been neglected by breeding, and almost no modern varieties do exist, local populations are still cultivated in many European areas, where they often represent typical components of local food systems.

Kales have been targeted as an investigation topic of BaseFood because of the following characters:

- *are local crops, widely used as food plants, highly appreciated in the native areas, where they represent the basis of several local food preparations*
- *recent research indicates them as potential sources of health promoting substances: glucosinolates, among glucosinolates, phenolics, carotenoids*

On site qualitative surveys, interviewing key respondents, were carried out in participant countries: Italy, Turkey, Portugal, Bulgaria and Georgia, aimed at:

- comparing local populations and uses and recording recipes, to investigate the role of kales in local food systems in a cross-cultural perspective
- investigating the local perceptions of the health promoting properties of these crops
- examining new uses and trends in the field of commercial medium scale production and updated foods derived from tradition

The survey areas and the local types

In Italy, Tuscany (areas 1 and 2) is the native area of the typical black kales (Cavolo nero) populations. These are rather variable in the morphological and more united in the intensive agriculture areas of the plains, whereas a certain selection has been carried out. The typical “braccio” and “Pompeii red” kale, with slender, dark and curly leaves belong to these populations. In the Liguria region (area 3) several types are present. Typical Black kale is similar to the Tuscan type, but with longer leaves. Broccoli “laungeons” forms a little elongated head and broccoli is similar to a heading type.

In Bulgaria, surveys about the uses of kolokhoz (kolchata) leaves have been carried out in the central and western Rodopi mountains (area 8), where local types are grown mostly in home gardens.

**The crops: growing and utilisation**

- **Kales are originally winter crops, with a present trend towards year-round growing**
- **Crops range from isolated plants to home gardens to medium-size commercial fields**
- **Local populations are self-propagated by farmers in traditional agriculture, whereas commercial cultivation and organized seed production is taking places in Italy and Portugal**
- **Local populations retain a high level of variability**
- **The leaves are manually picked from the base upwards, or the tops are cut**
- **In some industrial crops, the harvest is done by machine**

- **Fresh leaves are subject to home use in traditional areas, and sold in local markets**
- **Packed shredded kale leaves are sold in markets in Portugal to prepare caldo verde or other traditional dishes**
- **Precooked leaves are available in some supermarkets in Italy**
- **Local scale processors use kale leaves in Italy for the manufacturing of artisanal traditional and new foods**
- **In Turkey, kale is processed into traditional soups (ribollita toscana) and kara lahana gombas**
- **In Georgia Keshava phali leaves cooked and seasoned with chopped fresh coriander, garlic, onions and spices are prepared and sold in supermarkets**
- **In Bulgaria, kale is used in various soups and lentil stews**

**Food uses and recipes**

- **In traditional food systems, kales have the very clear function of being one of the few fresh vegetables available during winter time**
- **Traditional dishes are a precise way of combining fresh kale with energetic, storable ingredients, like potatoes, bread, corn meal, etc.**
- **Over 50 recipes with kales or kolokhoz leaves have been recorded and discussed with local informants. The main types are:**
  - **sage, where kale is used in variable amounts, but almost invariably in combination with a energetic component from cereals or beans**
  - **grains in Italy, where kale characterizes local palettes**
  - **soups in Turkey, where kale characterizes local palettes**
  - **stuffed leaves, present with a high number of variants including cereals, vegetables, cheese and meat as filling components**
  - **boiled leaves, seasoned in various ways, to be generally eaten with bread or little meat, when available, or used as a filling of pastries, in Bulgaria or bread, as observed in Turkey**
  - **In all cases, kale was hardly considered a side dish in traditional food habits, but rather an important ingredient of a main course.**

**Concluding remarks**

- **Kales represent examples of crops which interest is now growing, and stimulating wider uses than traditional ones, and the development of different scale exploitation schemes**
- **The conservation of local uses and germplasm seems to be more dependent on an adequate promotion of traditional uses knowledge**
- **The variability of situations encountered may be useful for the transfer of knowledge and ideas in different countries**

Acknowledgments. This research has received funding from the European Community’s Seventh Framework Program: 2007/2013 under grant agreement n. 227518. project BaseFood.
Kvass – from past to future: changing in time.

D. V. Karpenko, E. A. Betova, A. N. Krechevnikova
Moscow State University of Food Production, Moscow, Russian Federation

The end of the 2nd millennium B.C to the end of the 1st millennium B.C.
In “Velos Book”, which describes the history of the Slavs, it is mentioned that pre-Slav people prepared sacred beverages alike kvass and that their tribal chiefs received the secret of its preparation from God Krassor – Slavic Bacchus.

There is no reliable information on characteristics of these beverages. At the same time there is no information of the existence of such type of beverage in other countries.

989
"On the occasion of the baptism of Kiev residents, Prince Vladimir I" – Novgorodskii ordered to give them food and drink: honey in barrels and bread kvass" – Old Rus Chronicles

First documented mention about bread kvass. At that period kvass was stronger and thicker than modern beer.

XII century
Appearance of strong alcoholic drink – vodka, change of technology of kvass preparation.

Already it was not necessary to pursue after a fortress, it was therefore became to spare more attention to taste and quality, and a kvass’s fortune fell down approximately from 3% to 4% of ethanol and below.

XVII – XVIII centuries
Kvass was the most common low-alcohol drink in every class of society

Kvass was producing from different raw materials: cereals, fruits and vegetables, honey.

XIX century
Industrial production of kvass was started. Kvass was consumed in excess by peasants, lower-class citizens, and monks; for some persons it was usual to drink more kvass than water.

Expansion of source of raw materials due to the use of different types of malt and various cereal cultures (wheat, rye, barley, oat, corn, rice, buckwheat) is provided by its endless variety of sorts of kvass.

End of XIX century
Reforms on kvass influence on health.

At hospitals the production of obligatory dietary product were opened - hospital kvass.

1928 – 1930
Broad kvass is the most popular soft drink all over Soviet Union, especially during summer. Kvass spread to some Republics of USSR.

Kvass-selling stall were placed “on every corner” in cities and towns.

1999 – 2000
"Time of the oblivion"

Beverage’s market in Russia was occupied by imported drinks.

After 2001
Revival of bread kvass production and consumption. Big national plants expand the range of kvass’s sorts, small and medium local plants appear.

In 2008 bottled kvass sales had tripled since 2005 and estimated per-capita consumption of kvass in Russia reached three liters in 2008. Between 2005 and 2007, color of the Moscow soft drink market fell from 3% to 2%. Meanwhile, kvass’s share more than doubled over the same time period, reaching 14% in 2007. In response, Coca-Cola launched its own brand of kvass in May 2008. This is the first time a foreign company has made a significant entrance into the Russian kvass market. Pepsi has also signed an agreement with a Russian kvass manufacturer to act as a distribution agent.

Today according to the legislation (national standard) of Russian Federation kvass is national soft drink with the concentration of ethanol no more than 1.5% by volume, obtained as a result of incomplete spirituous or spirituous and lactic acid fermentation of wort produced from plant materials or products of its processing with the addition of natural sugar substances.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227118.
A typical high energy source
traditional food from Turkey: "Tahin with pekmez"

Bike Essoula, Osman Hayran, Filippo O’Antonacci
Yediboga University, Istanbul, Turkey

Introduction
"Tahin with pekmez" is a typical traditional food of Turkey. It is consumed on a daily basis by people of all ages of the country, especially during Ramadan. Following the islam rule of eating before sunset, because of its high energy providing properties.

Tahin (Sesame Paste)
Tahin is produced from ground, toasted, dry roasted sesame seeds. It has high nutritional value. It is rich in lipids (54.17%), protein (17.50%), carbohydrates (4.61% and dietary fiber (8.31%) and contain significant amounts of minerals (1134.79mg/kg), phosphorus (726.35mg/kg), and iron (59.18mg/kg) and zinc (0.19mg/kg). It is a good source of vitamin E, dietary fiber, and thiamin. It is a product that is known to help against breast cancer, Alzheimer disease, and diabetes. The production is also popular in Middle Eastern countries (Ozdemir & Gunes, 2014; Ozdemir et al., 1990).

Preparation of Tahin
The sesame seeds are removed and left overnight for soaking purposes. After the seeds are soaked, the nuts are ground to remove any remaining unsaponified lipids by using a mill. After gridding, the seeds are grounded for several times, after which the final product is obtained. The final product is a thick paste that can be eaten as a food product. It is most often used as a spread on bread, in salads, or as a main ingredient in dishes. It can be stored for months after production.

Tahin production:

<table>
<thead>
<tr>
<th>Sesame seeds</th>
<th>Grinding</th>
<th>Mixing</th>
<th>Grinding</th>
<th>Mixing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tahin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pekmez:

Pekmez is a popular traditional food. It is consumed by people of all ages. It is a thick, sweet, and sticky food. It is most often used as a spread on bread, in salads, or as a main ingredient in dishes. It can be stored for months after production. It is most often used as a spread on bread, in salads, or as a main ingredient in dishes. It is a popular food in Turkey, Syria, Iraq, and Lebanon.

Preparation of Liquid Grape Pekmez
Grape pekmez is prepared from grape juice. It is obtained by boiling the juice without adding sugar or other food ingredients. The product can be consumed as a source of food containing natural sugars, vitamins, and other nutrients. Tahin of ground sesame seeds is consumed as a food product. It is used as a spread on bread, in salads, or as a main ingredient in dishes. It is a popular food in Turkey, Syria, Iraq, and Lebanon.

Grape pekmez is prepared from grape juice. It is obtained by boiling the juice without adding sugar, or other food ingredients. The product can be consumed as a source of food containing natural sugars, vitamins, and other nutrients. Tahin of ground sesame seeds is consumed as a food product. It is used as a spread on bread, in salads, or as a main ingredient in dishes. It is a popular food in Turkey, Syria, Iraq, and Lebanon.

References:

Nutrition Department, Federal Institute of Food Research - 2007, USDA Human Body Laboratory.


RECOVERY AND UTILIZATION OF THE THREATENED OLIVE CV TORTIGLIONE

Leva AnnaRita 1, Ena Alba 2, Levo Diego 3

1 Valsal, CNR, Secco Fino (Firenze), Italy; 2 HSE, CNR, Secco Fino (Firenze), Italy; 3 Aprutina Pianta s.s.a.s Via C. da Vallo, Pescara, Italy

Introduction

The conservation of biodiversity of cultivated crops often relies on the work of local farmers over generations. One example of a potential conservation priority is the olive cv Tortiglione, a valuable local olive cultivar from the province of Teramo (Italy), currently only represented by individual trees and some orchards of limited area owned by local growers. The scientific literature on the cv Tortiglione and its olive oil is partially and often contradictory but it is known that the oil from the cv Tortiglione is distinct for its bitter and pungent taste due to the high polyphenol contents which are valuable natural antioxidant compounds. The olive phenolic compounds are hydrophilic, therefore a little amount is present in the olive oil (2%), the remaining part is collected in the by-products: wastewater (OMW > 55%) and pomace (45%).

The aim of this preliminary study was to analyze the oil and by-products from the olive oil Tortiglione to assess the polyphenol content, in order to determine the viability of reducing this cultivar on local agricultural lands.

Materials and methods

Olive oil extracted by the two-phase process was sampled at the olive mill Montecchia (October 2011 harvest), and analyzed according to the EU Commission Regulation methods (1993) [1]. Total polyphenolic compounds in the oil mill by-products (wet pomace) were determined in according to Ena et al., 2011 [2].

Results and discussion

Table 1 shows the chemical parameters of olive oil that confirm the classification of extra virgin oil.

Tortiglione olive oil can be considered a good example of “functional food” because contains both an high content of monounsaturated fatty acid and total phenols (polyphenols and tocochromens) (tab.1). Further, this olive oil shows a good ratio PUFA and SFA that supports its salutary effect (tab.2). Moreover, the polyphenol compounds are among the highest in relation to most widespread Italian olive oils (tab.3). Finally, figure 3 shows the high level of oleic acid similar to the trend of the Italian extra virgin olive oils.

The preliminary investigation on the by-products resulted very interesting: the analysis on pomace (fig. 3) highlighted a very high level of polyphenols that might be recovered, representing an economical added value for farmers.

Conclusion

The analysis conducted can not be considered complete but represent the first study that has been dedicated to the by-products of the Tortiglione olive oil. Further investigations are in progress. Tortiglione olive oil appears to be a good example of “functional food”. The high polyphenol level in oil and by-products from the cv Tortiglione supports the recovery of the cultivar as an interesting niche market product for farmers. By-products represent an interesting source of natural phenols that possess wide range of biological activities. Therefore, their recovery could represent added value for agro-food industries. Moreover, this attractive olive tree could extend the use of the most iconic tree of the Mediterranean region into ornamental horticulture to diversify the production of perennial ornamental plants in nurseries.

Fig. 1 Olive fruits cv Tortiglione

Tab. 1. General characterization of Tortiglione oil

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidity</td>
<td>% M/M oleic acid</td>
<td>0.28</td>
</tr>
<tr>
<td>Peroxide value</td>
<td>mEqO₂/kg</td>
<td>11.84</td>
</tr>
<tr>
<td>K232</td>
<td>K</td>
<td>1.91</td>
</tr>
<tr>
<td>K270</td>
<td>K</td>
<td>0.16</td>
</tr>
<tr>
<td>Δ1</td>
<td>Δ1</td>
<td>-0.04</td>
</tr>
<tr>
<td>Tocopherols</td>
<td>mg/Kg</td>
<td>371.00</td>
</tr>
<tr>
<td>Polyphenols</td>
<td>mg/Kg</td>
<td>371.00</td>
</tr>
</tbody>
</table>

Fig. 2 Olive trees cv Tortiglione

Tab. 2. Fatty acid composition

<table>
<thead>
<tr>
<th>% N/M</th>
<th>Total fatty acids</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFA</td>
<td>15.27</td>
</tr>
<tr>
<td>MUFA</td>
<td>75.69</td>
</tr>
<tr>
<td>PUFA</td>
<td>9.02</td>
</tr>
<tr>
<td>PUF/A</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Fig. 3 Fatty acids composition of Tortiglione olive oil

Tab. 3. Comparison among oils of different cvs [3]

<table>
<thead>
<tr>
<th>Culture</th>
<th>Region</th>
<th>Monounsaturated fatty acid (%)</th>
<th>Polyunsaturated fatty acid (%)</th>
<th>Saturated fatty acid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torino</td>
<td>North</td>
<td>75.64</td>
<td>12.74</td>
<td>11.62</td>
</tr>
<tr>
<td>LSPM</td>
<td>Italy</td>
<td>71.34</td>
<td>17.04</td>
<td>11.62</td>
</tr>
<tr>
<td>LSPM</td>
<td>Italy</td>
<td>70.61</td>
<td>17.57</td>
<td>11.82</td>
</tr>
<tr>
<td>POMACCHIO</td>
<td>Italy</td>
<td>71.61</td>
<td>16.04</td>
<td>12.35</td>
</tr>
<tr>
<td>POMACCHIO</td>
<td>Italy</td>
<td>73.47</td>
<td>16.04</td>
<td>10.51</td>
</tr>
<tr>
<td>POMACCHIO</td>
<td>Italy</td>
<td>71.75</td>
<td>15.84</td>
<td>12.41</td>
</tr>
<tr>
<td>POMACCHIO</td>
<td>Italy</td>
<td>71.75</td>
<td>15.84</td>
<td>12.41</td>
</tr>
</tbody>
</table>

The pomace (fig. 3) highlighted a very high level of polyphenols that might be recovered, representing an economical added value for farmers.

Fig. 4 Orchard of olive trees cv Tortiglione

References

Wild plants and traditional foods in Val D’Agri area (Potenza) of Lucania

Sabrina Sansanelli and Annalisa Tassoni

Department of Experimental Evolutionary Biology, University of Bologna, Italy

The field work was conducted in Val D’Agri area (Potenza, Lucania) during the period May–August 2012. Ethnobotanical information was collected after semi-structured and structured interviews with 20 persons, who still retain traditional environmental knowledge, and after many talks with local people.

Wild food plants and traditional knowledge

Food and dishes always represent the regional identity of people, ethnic group and communities and the use of wild food plants is an important part of the traditional local knowledge. Born because of hunger, wars, drought, poorness and grown up in rural societies, food use of wild plants slowly stratified in a territory becoming part of its habits. Often neglected as area of survey, the traditional knowledge of wild food plants is crucial to maintain both cultural and biological diversity.

Lucanian culinary traditions

Lucania cooking has old origin and is strictly linked to the rurality of the people. It is a poor simple cooking but racy, tasty and savoury.

Following we report some traditional Lucania recipes using wild plants that have been passed on until now becoming traditional foods.

Radish (roots of Armoracia rusticana Gaertn., Mey. et Scherb.) is used for ‘rafrena’; (rafeno is the radish italian name) an omelet widely cooked during Carnival and grated on home pasta, oiled with ‘fericelli’, a typical pasta made with a sort of knitting needle.

Lucanian salami aromatized with wild fennel seeds (Foeniculum vulgare Mill.)

Wild asparagus (Asparagus acutifolius L.) spears boiled and then fried with olive oil, garlic, eggs and salami.

‘Lampascioni’ (bulbs of Leopoldia comosa L.) and their many ways to be preserved and cooked.

It’s meaningful to note that Sambucus nigra L. flowers, that are not at all used in Val D’Agri area, are widely used in a very near village, Chiaromonte (PZ), demonstrating how deep-rooted and geographically limited is the traditional knowledge about wild food plants.

Loss of traditional knowledge about plants and urgent need of ethnobotanical studies

Wild food plants, symbol of poorness and adversity, are today strongly reevaluated representing biodiversity, healthy, nature bond and folkway comeback.

Nevertheless, traditional wild plant foods are quickly disappearing for different reasons:
- abundance and easy availability of vegetables
- less rural societies
- use of agricultural mechanized machines, weeds, pesticides, pollution and aggressive building trade destroying wild flora.
COMPARISON OF PROXIMATE DATA AMONG TRADITIONAL FOODS FROM BLACK SEA AREA COUNTRIES PER FOOD GROUP


* Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, I.P., Lisbon, Portugal; 
† Institute of Food Research, Nenchev Research Park, Colney, Northen, United Kingdom; 
‡ Hellenic Health Foundation, Athens, Greece; 
§ Department of Hygiene, Epidemiology & Medical Statistics, Medical School, University of Athens, Greece; 
¶ University of Food Technologies, Plovdiv, Bulgaria; 
∥ Uzhhorod National University, Uzhhorod, Ukraine; 
* Bucharest Academy of Economic Studies, Bucharest, Romania.

Traditional foods from 6 Black Sea Area Countries (Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine) were prioritized within the frame of the European project BaSeFood (Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods) [1]. One of the aims within BaSeFood project was to produce an overview of the nutritional value of each traditional food and compare it among the categorized food groups.

SELECTED TRADITIONAL FOODS

- **BULGARIA**
  - (A) Baked sauce of yogurt mixed with sesame; (B) Nokha (C) Milk (D) Rusk (E) Pepper
- **GEORGIA**
  - (A) Tzvri with walnuts; (B) Tbilis,; (C) Grape; (D) Rice,; (E) Wheat
- **ROMANIA**
  - (A) Confectionary; (B) Rice and milk; (C) Lentil; (D) Blueberry soft drink; (E) Plum jam
- **RUSSIAN FEDERATION**
  - (A) Baked bread with sugar; (B) Pancakes; (C) Honey; (D) Vegetable seasonings
- **TURKEY**
  - (A) Black tea; (B) Burger; (C) Meat; (D) Vegetables; (E) Olive oil
- **UKRAINE**
  - (A) Bread; (B) Sesame bread; (C) Pita; (D) Pita bread; (E) Cheese

COMPONENTS

- **Moisture**
- **Fatty acids**
- **Ash**
- **Starch**
- **Total protein**
- **Total sugars**
- **Total fat**
- **Total dietary fiber**

The proximate composition of the selected traditional foods from Black Sea Area countries is important in order to elucidate their role in the dietary pattern of populations and will be useful to include new nutritional data in national food composition databases.

ACKNOWLEDGEMENTS

The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n°227118.

REFERENCES


Vegetables and vegetable based foods; herbs, spices and aromatic plants; and low or non-alcoholic fermented foods and beverages of plant origin were the food groups with the lower energy content mainly due to its high water content (>60.0 g/100 g).

Oils seeds or oilseeds products were the group that presented the highest mean content of ash (2.23 g/100 g), total protein (15.9 g/100 g) and total fat (72.0 g/100 g).

Sourdough bread, which belongs to the cereals and cereal-based foods group, contained the highest starch content (66.3 ± 0.65 g/100 g).

The highest total sugars content (83.3 ± 0.30 g/100 g) was found in rose jam, a food from the fruit or fruit based foods group.

All results are given per 100 g of edible portion.
SELECTED TRADITIONAL FOODS FROM BULGARIA IN THE FRAME OF BASEFOOD PROJECT

Iordanka Alexieva a, Tânia G. Albuquerque b, Ana Sanches-Silva b, Paul Finglas c, Effie Vasilopoulou d, Antonia Trichopoulou d,e, L. Filippo D’Antuono f, Helena S. Costa b

a University of Food Technologies, Plovdiv, Bulgaria; b Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, LIP, Lisbon, Portugal; c Institute of Food Research, Norwich Research Park, Colney, Norwich, United Kingdom; d Department of Hygiene, Epidemiology and Medical Statistics, Medical School, University of Athens, Greece; e Hellenic Health Foundation, Athens, Greece; f Campus of Food Science, Ossona, University of Bologna, Italy

E-mail: tania.albuquerque@isnna.min-saude.pt

Bulgaria is located in Southeast Europe, in the northeast part of the Balkan Peninsula. Its location on the transition line between two climate zones influences the climate, soils, vegetation and animal species. Bulgarian cuisine is exceptionally diverse and delicious, consisting of various salads, breads, soups, stews, and other local foods. Many of the dishes are prepared according to traditional recipes and have been passed from generation to generation over the centuries. This study was carried out within BASEFOOD project (Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods) and the aim was to determine the nutritional composition of six traditional foods from Bulgaria [1].

<table>
<thead>
<tr>
<th>TRADITIONAL FOOD</th>
<th>FOOD DESCRIPTION</th>
<th>NUTRITIONAL COMPOSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tikvenik</td>
<td>A dessert made of layers of pastry with pumpkin, sugar, cinnamon and walnuts</td>
<td><img src="image" alt="Nutritional Composition Graph" /></td>
</tr>
<tr>
<td>Rodopan dried beans</td>
<td>A bean soup with a characteristic taste</td>
<td><img src="image" alt="Nutritional Composition Graph" /></td>
</tr>
<tr>
<td>Doko ot rozi</td>
<td>Sweet thick syrup with rose petals (Rosa damascena Mill.)</td>
<td><img src="image" alt="Nutritional Composition Graph" /></td>
</tr>
<tr>
<td>Tahan Halva</td>
<td>A dessert prepared with sugar or sugar syrup, sunflower seeds and raisins</td>
<td><img src="image" alt="Nutritional Composition Graph" /></td>
</tr>
<tr>
<td>Mursal tea</td>
<td>An infusion of Salvia acutifolia</td>
<td><img src="image" alt="Nutritional Composition Graph" /></td>
</tr>
<tr>
<td>Boza</td>
<td>A thick, fermented cereal based beverage with a slightly sour/sweet flavour</td>
<td><img src="image" alt="Nutritional Composition Graph" /></td>
</tr>
</tbody>
</table>

- Mursal tea, millet ale and rodopan dried beans were the analysed traditional foods with the lowest energy content due to the high water content (>81%)
- Total protein content varied between 0.34 ± 0.01 g/100 g and 11.6 ± 0.10 g/100 g for rose jam and halva, respectively.
- Halva was the selected traditional food with the highest amount of total fat (30.1 ± 0.74 g/100 g), from which the major fatty acids were unsaturated, since it is made with sunflower seeds.
- High carbohydrate content was found for Baked layers of pastry stuffed with pumpkin (33.0 ± 0.30 g/100 g), halva (47.7 ± 0.64 g/100 g) and rose jam (86.6 ± g/100 g). In the case of Baked layers of pastry stuffed with pumpkin most of the carbohydrates correspond to starch (11.4 ± 0.23 g/100 g) while in the case of halva and rose jam most of the carbohydrates correspond to sugars (48.3 ± 0.23 g/100 g and 85.3 ± 0.30 g/100 g, respectively).

ACKNOWLEDGEMENTS

New data on nutritional composition of Bulgarian traditional foods will enhance the knowledge base on traditional foods which is necessary for the development of exploitation plans and will be useful for their promotion.

REFERENCES

The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 276358.
Study of the antioxidant activity of selected local Bulgarian culinary spices
Alexieva I. a, Mihaylova D. b, Popova A. c
a Dep. Of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria
b Dep. Of Biotechnology, University of Food Technologies, Plovdiv, Bulgaria

Introduction
The study aims at evaluating antioxidant activity and total polyphenolic content of Bulgarian local spices “levurna (Allium ursinum L.), “samardala” (Allium bulbocastanum), and “matochina” (Melissa officinalis) used for centuries as a folk remedy for diseases and as food ingredients. Antioxidants in plants play important role in foods and living organisms because of the radicals scavenging ability and reducing cells degradation in the human body for which they are recognized as anti-aging, anti-inflammatory, anti-cancerous, etc., which explains the interest of the researchers.

Materials and methods
Wild “levurna” Allium ursinum L. (Krichim), and “samardala” Allium bulbocastanum (Sara Zagora), “matochina” Melissa officinalis (Sara Zagora) collected in spring 2012 are analyzed fresh and dried. The content of dry matter of fresh herb was determined by BS5. Methods of extraction, based on the traditional application of the studied plants: water infusion (HM hydro module-20; 30 min extraction with water brought to boiling point), decoction (HM 20; 30 min boiling in water), 70 % and 96 % ethanol extracts and a methanol extract (HM 20; 3 times 30 min at 70 °C), supernatant of fresh spices (mashed with quartz sand, diluted with 0.1 mol, pH 7.0 and centrifuged at 10 min at 4 °C, 15 000 g). Antioxidant activity is estimated with the use of DPPH (modification of Brand-Williams et al., 1995) and ABTS (Re et al., 1999) radical scavenging methods. Total polyphenolic content (TPC) is determined by the modified method of Kujala et al. (2010) with Folin-Ciocalteu’s reagent. Gallic acid is used as a calibration standard and results are expressed as gallic acid equivalents (GAE) per 100 grams DW. Reduction capacity (RC) is determined by the method of Oulas (1986) using L-ascorbic acid as a standard.

Results
The extraction with 70% ethanol gives the highest DPPH, ABTS, TPHC and RC values. The highest DPPH scavenging activity is determined for the 70% ethanol extract of “matochina” Melissa officinalis, while for ABTS it is “samardala” Allium bulbocastanum that shows the highest value. The highest values of TPHC are achieved with 70% ethanol extraction of “matochina”. Water extraction (infusion) resembles the cooking process and the process of herbal infusion (“cha”), prepared most often in folklore medicine “Matochina” (Melissa officinalis) infusion is characterized by the highest TPC values (21.78 mg GAE/g). Decoktion, similar to most of the cooking processes, arranges the studied spices in the following raw according to their antioxidant characteristics: “matochina” > “samardala” > “levurna”. The supernatant of fresh “levurna” shows better antioxidant activity than “samardala”, although the method of the sample preparation is characterized by the lowest values of DPPH, ABTS, TPHC and RC for all of the studied samples.

Conclusions
The method of extraction affects the antioxidant activity characteristics of the spices, least felt in the “levurna” samples.
A systematic and comprehensive study of traditional foods in the Turkish food composition database project

Birgül Amoutzopoulou, Özil Birüngen Lock, Mustafa Yaman, Serenem Aliyus, Cevikhalp
TUBITAK Marmara Research Center Food Institute, Gebze, Kocaeli, Turkey. Phone: +90 262 6772211 Serenem Celmen@tubitak.gov.tr
www.turkom.gov.tr

Traditional Foods Work Package
Turkish Food Composition Database (T-FCDB) Project
study the traditional foods at a national level
provide information on food composition, historical-cultural properties.

Systematic and Standardized Study of Traditional Foods
A standardized and systematic procedure was applied for the study of traditional foods.

- Prioritization
  Around 50 traditional foods originated in Turkey were prioritized;
  - with a group of members from universities, The Ministry of Agriculture
  and Turkish cuisine specialists;
  - according to: Trade and economic factors
    - Use of consumer groups
    - Health implications
    - Use of traditional ingredients (primary foods)

- Sampling (Stratified Sampling)
  Food samples represent the geographical recipe variations:
  - Selection and identification of geographical areas
  - Selection of local food producers
  - Collection of samples

- Sample Handling
  - Transfer of samples
  - Composite sample preparation for each geographical area
  - Laboratory sample preparation
  - Moisture determination
  - Distribution of lab sample to selected labs

- Analysis
  A quality system includes aspects of accuracy, precision, representativeness;
  - Validated and appropriate analytical methods were used
  - Most of the laboratories were accredited
  - Analytical quality assurance system
    - Proficiency testing schemes were applied
    - Certified reference materials (CRM) were used.

- Data Evaluation
  Identifying any data inconsistencies and to compare the data with results for similar products from other data sources

- Reporting (Recipe/Production Method)
  In each location:
  - Informing local food producers with official letters
  - Selection of local producers/ households
  - Recipe recording
  - Photographs
  - Temperature measurement
  - Filling forms
  - Interview to collect information on the cultural/historical properties

- Literature Survey
  Documentation of traditional character
  Comprehensive literature review (libraries, palace collections etc.)

- Study Materials
  Number of study materials are developed for each study activity
  - Official methods for study information
    - Official collaboration agreements food materials
    - Standard filing forms for recipe recording (paper and online format).
    - Standard filing forms for lab sample transfer
    - Standard filing forms for analysis results (paper and online format).
    - Guidelines for sampling
    - Standard filing forms and guidelines for literature survey

- COUNTRY REPRESENTATIVE SAMPLING

- Results/Conclusion
  All analytical data and collected food information were transferred into the traceable online system

  Recipes and samples were collected from
  150 geographical areas for
  50 traditional foods

  Analytical food composition data on 150 composite samples with collaboration of 11 project partner laboratories

Acknowledgments. The authors would like to thank the team of EuroFIR
Network of Excellence (FOOD-CT-2005-512944) for their contribution towards improving our technical knowledge on traditional food studies.

References:
Lock O.B, Amoutzopoulou B, Ozkak S.O, Genc H, Ozkak C, Bayrak A., A pilot study on food composition of five traditional foods, BF6 (accepted paper).

Funding acknowledgment: This work has been funded by TUBITAK (The Scientific and Technological Research Council of Turkey) the Public Research Grant Committee (KANAG) of Support Programme for Research Projects of Public Institutions (1007), 1072288.
SELECTED TRADITIONAL FOODS FROM WESTERN UKRAINE
IN THE FRAME OF BASeFOOD PROJECT


* Uzhhorod National University, Uzhhorod, Ukraine; † Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, L.P., Lisbon, Portugal; # Institute of Food Research, Norwich Research Park, Colney, Norwich, United Kingdom; # Hellenic Health Foundation, Athens, Greece; † Department of Hygiene, Epidemiology & Medical Statistics, Medical School, University of Athens, Greece; * Campus of Food Science, Cesena, University of Bologna, Italy

E-mail: helena.costa@insa.min-saude.pt

The Ukrainian traditional foods are characterized by the use of a large diversity of recipes for the same dish. The best example is the traditional Ukrainian food — borsch — known at least in dozens of varieties containing up to twenty ingredients.

This work aims to determine the nutritional composition of three traditional foods from western Ukraine that have been prioritised in the frame of the BaSeFood project: Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods [1].

TRADITIONAL FOOD	FOOD DESCRIPTION	NUTRITIONAL COMPOSITION

Transcarpathian green borsch
Zelenyj borsch
Zakarpats'kyj
Thick vegetable soup with sorrel

Roasted sunflower seeds
Smazhene nasnnya
Roasted sunflower seeds

Cottage cheese with dill and garlic
Pomazanka
Cottage cheese spread with dill and garlic

The energy value for the analysed traditional foods was 181 kJ/43 kcal for Transcarpathian green borsch, 687 kJ/164 kcal for cottage cheese with dill and garlic, and 2675 kJ/640 kcal for roasted sunflower seeds.

From the three selected traditional foods for western Ukraine, roasted sunflower seeds have the highest total fat content (58.2 ± 2.16 g/100 g), of which 49.4 g/100 g are unsaturated fatty acids.

Roasted sunflower seeds also contain a high protein content (20.8 ± 0.40 g/100 g) and a considerable total dietary fibre content (11.3 ± 1.09 g/100 g).

Regarding the available carbohydrates content, the amount per 100 g was 2.49 ± 1.33 g for roasted sunflower seeds, 5.52 ± 1.75 g for Transcarpathian green borsch and 8.29 ± 0.25 g for cottage cheese with dill and garlic. In the case of roasted sunflower seeds, most of the carbohydrates were sugars (2.36 ± 0.13 g/100 g). Results are given per 100 g of edible portion.

This study will contribute to characterize the dietary pattern of western Ukraine as a part of the cultural inheritance of this country. Moreover, these results can be useful to preserve and promote these traditional foods.

ACKNOWLEDGEMENTS

REFERENCES

Effects of 6 weeks consumption of bioactive-rich nettle and Sideritis teas on endothelial function and other markers of cardiovascular disease risk in an at-risk subject group: a randomised controlled trial

Introduction. Diets rich in fruits and vegetables have health-protective effects, which could be translated in reduction of risk of cardiovascular disease (CVD). It has been postulated that beneficial effects of such diet could be attributed to polyphenolic compounds found in numerous plant foods. There is a substantial body of scientific evidence that flavonoids of plant origin favorably influence endothelial function, blood pressure, lipid profile and insulin sensitivity. Many traditional foods of Black Sea region containing or based on plants are rich in bioactive substances and polyphenols. Both Sideritis spp. and Urtica spp. contain flavonol or flavonoid-related substances which could potentially influence endothelial function.

Materials and methods. We have conducted a randomized, parallel design (3 groups, n=27 per group) clinical trial investigating the effects of mountain tea (Sideritis Scardica) and Nettle (Urtica Dioica) on endothelial dependent flow mediated vasodilation and other risk markers for CVD.

Subjects were randomized to receive either a) 2 g dried mountain tea infused in 200 ml hot water b) 3 g dried nettle infused in 200 ml hot water or c) 200 ml hot water as a placebo control. Flow-mediated vasodilatation (FMD) was measured at baseline and after 6 weeks of follow-up.

Primary endpoint: FMD in study groups

Secondary endpoints: blood pressure and plasma lipids

Results. There were no significant differences in FMD between the 3 groups at baseline.

Neither treatment has demonstrated a favorable effect on FMD comparing to control group. The mean change in FMD was significantly lower after 6 weeks regular ingestion of nettle (5.90 ± 2.33% compared with 7.62 ± 3.92% p = 0.037 (unadjusted)) but the difference was not significant when compared with the control group. There were no beneficial effects on blood pressure after ingestion of either sideritis or nettle. There was a small decrease in total cholesterol after 6-weeks consumption of both nettle (6.1%) and sideritis (4.5%) when compared with baseline values. Similarly, total cholesterol was lower in the nettle and sideritis groups compared with control at the 6-week time point (by 4.5% and 6.5% respectively). Same applies to LDL-cholesterol with differences between nettle and control at 6 week time point 8.4% and sideritis and control at 6 week time point 14.0%.

However, none of the effects were significant.

Conclusions. Six-week consumption of Sideritis Scardica and Nettle (Urtica Dioica) in the form of water decoction did not influence flow-mediated vasodilatation in patients at high cardiovascular risk. No improvement was seen in office blood pressure levels or plasma lipids.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118, project BadoFood.
SELECTED TRADITIONAL FOODS FROM ROMANIA
IN THE FRAME OF BASEFOOD PROJECT

Carmen Costea a, Ana Sanches-Silva b, Tânia G. Albuquerque c, Paul Finglas d, Adrian Vasi e, Diana Tamu f, Effie Vasiopoulou g, Antonia Trichopoulou h, L. Filippo D’Antuono i, Helena S. Costa b

a) ASE Bucharest, Romania; b) Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, L.P., Lisbon, Portugal; c) Institute of Food Research, Norwich Research Park, Colney, Norwich, United Kingdom; d) Department of Hygiene, Epidemiology & Medical Statistics, Medical School, University of Athens, Greece; e) Hellenic Health Foundation, Athens, Greece; f) Campus of Food Science, Cesena, University of Bologna, Italy.

E-mail: helena.costa@msa.min-saude.pt

Romania has an old tradition in different dishes that suffered outstanding influences along the time from: a) developed countries cuisines and experiments - French, Prussian; b) invading people (Ottomans), c) neighbourhoods related - Serbian, Hungarian, Ukrainian. Despite the strong influences, national food still maintained its own character. This work aims to determine the nutritional composition of five traditional foods from Romania that have been prioritised in the frame of the BaSeFood project (Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods) [1].

<table>
<thead>
<tr>
<th>TRADITIONAL FOOD</th>
<th>FOOD DESCRIPTION</th>
<th>NUTRITIONAL COMPOSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornmeal mush</td>
<td>Prepared from corn flour boiled in salted water</td>
<td>Energy 387 kJ (90 kcal)</td>
</tr>
<tr>
<td>Mămâlăgă</td>
<td></td>
<td>Carbohydrates: 92.6% Fat: 2.1% Protein: 4.0%</td>
</tr>
<tr>
<td>Nettle sour soup</td>
<td>A dish consisting of a sour soup made from fermented wheat bran, vegetables and green nettle leaves harvested from young plants</td>
<td>Energy 194 kJ (47 kcal)</td>
</tr>
<tr>
<td>Ciorbă de urzici</td>
<td></td>
<td>Carbohydrates: 92.6% Fat: 2.1% Protein: 4.0%</td>
</tr>
<tr>
<td>Herbal dish</td>
<td>A delicious spring broth with green herb leaves. This herbal dish is served cold during fasting periods</td>
<td>Energy 209 kJ (50 kcal)</td>
</tr>
<tr>
<td>Mâncăriță de verdeață</td>
<td></td>
<td>Carbohydrates: 92.6% Fat: 2.1% Protein: 4.0%</td>
</tr>
<tr>
<td>Elderberry soft drink</td>
<td>Natural home-made soft drink, without preservatives or artificial colours made from elderberry flowers</td>
<td>Energy 59 kJ (14 kcal)</td>
</tr>
<tr>
<td>Socata</td>
<td></td>
<td>Carbohydrates: 92.6% Fat: 2.1% Protein: 4.0%</td>
</tr>
<tr>
<td>Plums jam</td>
<td>A traditional plum Paste, obtained by boiling the plums without sugar</td>
<td>Energy 732 kJ (175 kcal)</td>
</tr>
<tr>
<td>Magiur de prune</td>
<td></td>
<td>Carbohydrates: 92.6% Fat: 2.1% Protein: 4.0%</td>
</tr>
</tbody>
</table>

- The energy value for the analysed Romanian traditional foods varied between 90 kJ/24 kcal for elderberry soft drink and 732 kJ/175 kcal for plums jam.
- The food with the highest available carbohydrates content was plums jam with 40.1 ± 0.40 g/100 g of edible portion.
- Among the analysed traditional foods, total fat varied between 0.237 and 3.58 g/100 g of edible portion, while total protein ranged from 0.963 to 1.99 g/100 g of edible portion, with the exception of elderberry soft drink, which does not contain these nutrients.
- Herbal dish presented the highest content of total dietary fibre (3.41 ± 0.26 g/100 g), followed by plums jam with 3.30 ± 0.14 g/100 g of edible portion.

This study provided new data on nutritional composition of five traditional foods from Romania, in order to preserve and promote these foods.

ACKNOWLEDGEMENTS

REFERENCES

The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007–2013) under grant agreement L.227716.

**Introduction.**

*Anethum graveolens* L. (dill) is considered anti-hypercholesterolemic in folk medicine. Plants from the *Brassicaceae* family are rich sources of biologically active compounds such as flavonoids. Positive effects on cholesterol metabolism by dill and by various *Brassica* spp. have been previously reported [1-2], and they have been hypothesized to be in part related to the inhibition of HMG-CoA reductase (HMG-CoAR) enzyme through a downregulation of the encoding gene.

In this study we evaluated the modulation of genes and proteins related to cholesterol metabolism and trafficking by *kale* and *dill* extracts in HepG2 cells. Results obtained were compared to those obtained in control, cholesterol and mevastatin treated cells.

**Materials and Methods**

Dill and kale were extracted using hot 70% MeOH [3] and their total phenolic content and pattern analysed by the Folin-Ciocalteu assay and by LC-DAD-MS. In kale extract, glucosinolate composition and content were also evaluated. The vegetable extracts were supplemented to HepG2 cells for 24 h. Gene expression analysis of sterol regulatory element binding protein (SREBP)-1 and -2, HMG-CoAR, and LDL receptor (LDLR) was performed by quantitative real-time PCR. Gene expression was normalized to four reference genes, ACTB, GAPDH, HMBS, and SDHA, selected on the basis of previously published literature [4].

Real time data was analysed with DataAssist Software (Applied Biosystems, USA). The expression of corresponding proteins was carried out by western blot analysis.

**Results and Discussion**

Total phenolic content (TPC) of the extracts ranged from 42.60 µg gallic acid equivalent/mg (kale) to 58.07 (dill).

In preliminary experiments, the possible cytotoxicity of the supplemented extract was verified. No differences in cell proliferative activity were observed in cells supplemented with kale and dill extracts or mevastatin in comparison with the respective control, while a significant decrease was evidenced in CHOL supplemented ones.

The transcription of the *gene encoding for SREBP-1* (SREBP-1) was significantly increased in cells supplemented with dill and kale extracts, without any modification of the expression of both the *uncleaved and cleaved form of the encoded protein*. Any of the supplementation caused modification in the gene and protein (uncleaved and cleaved forms) expression of *SREBP-2*.

HMG-CoAR and LDLR gene transcription was similar to control in all supplemented cells but mevastatin treated ones. Our data on the effects of mevastatin treatment on HMG-CoAR and LDLR gene expression are in agreement with the current literature [5-7]. To our surprise, HMG-CoAR protein level was increased by dill supplementation and LDLR protein expression appeared increased in kale supplemented cells.

**Conclusion**

This study was designed to elucidate the mechanisms underlying the cholesterol-lowering effect of kale and dill extracts. Although the use of extracts in spite of pure molecules could appear a limitation of the study, our aim was to decipher the activity of the whole food at molecular level. For this reason, cells were supplemented with relatively low amounts of the extracts in order to mimic a nutritional effect and not a pharmacological one.

**References**


**Acknowledgments.** The research leading to these results has received funding from the European Community Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118 project BaseFood. The Authors thank Nisarga Boyle (Ulster University, Northern Ireland) and Erik Kacgolu and Osman Hayran (Yeditepe University, Turkey) for providing kale and dill.
Traditional Food International (TFI-2012) - Cesena, 4 - 5 October, 2012

MECHANISMS FOR THE CHOLESTEROL-LOWERING EFFECT OF PHYTOSTEROLS. MAIN BIOACTIVES OF MANY BLACK SEA AREA TRADITIONAL FOODS

Francesca Danesi *, Ana M. Gómez-Caravaca *, Danilo de Base *, Vito Verardo *, Annalisa Pession *, M. Fiorenza Caboni *, Alessandra Boretti *

* University of Bologna, Italy; * University of Granada, Spain.

INTRODUCTION

Intracellular cholesterol concentration regulates both cholesterol synthesis and uptake from blood. Sterol regulatory element binding proteins (SREBP) are master regulators. Nuclear SREBP concentration decreases when intracellular cholesterol is high, to reduce the transcription of genes related to cholesterol metabolism, as those encoding for HMGC-CoA reductase and LDL receptors. Cholesterol can regulate its own metabolism in the cell due to the presence of a sterol sensor domain (SSD) in SREBP proteins. It is not clear if this domain can sense free cholesterol only, or other sterol such as phytosterol (PS) can contribute to the regulation. Since PS chemical structure is very similar to cholesterol, they could mimic its action within the cell, and their increased concentration could reduce nuclear SREBP concentration. To verify this hypothesis, selected PS (sitosterol, campesterol, and brassicasterol) were added - separately or in a mixture - to cardiac cells in culture. PS supplemented cells were compared to unsupplemented ones (control) and to cells supplemented with cholesterol or treated with a cholesterol-lowering drug, mevinolin.

METHODS

Cell culture and treatments
Cardiac cells were obtained from the ventricles of newborn Wistar rats following the Yagel method [1] and seeded at 1 x 10^6 cells/mL concentration. 24 h after seeding, cardiomyocytes were divided at random in seven groups: a) unsupplemented (control); supplemented with b) mixture of PS (13 μM), c) sitosterol (13 μM), d) campesterol (13 μM), e) brassicasterol (13 μM), f) cholesterol plus 25-OH-cholesterol (10 μg/mL + 1 μg/mL), g) mevinolin (0.05 μM).

Identification and quantification of PS in cardiomyocytes by GC/MS
The cells were washed three times in PBS, and scraped off in cold PBS. Phytosterols were extracted from lipids after a cold saponification [2], using hydroxylcholesterol as internal standard. Before GC/MS analysis, the trimethylsilyl derivatives of PS were obtained [3]. One μL of the derivatised sample was analyzed.

Cell proliferation/ viability assay
Cell proliferative activity was evaluated using the MTT colorimetric assay [4] while cell viability was assessed measuring lactate dehydrogenase (LDH) activity in the media [5] and considering it as an index for cellular toxicity.

RNA isolation and qRT-PCR
Total RNA was isolated from cultured cells with the RNeasy Mini Kit (Qiagen, Germany) and its quality and concentration were assessed using the Nanodrop 2000 (ThermoFisher Scientific, USA). Gene expression analysis of HMGC-CoAR, LDDL, SREBP1, and SREBP2 was performed by quantitative two-step real-time PCR by a 6000 Rotor Gene (Corbett, Australia) apparatus, according to Quantitect Sybr Green PCR kit (Qiagen, Germany).

Gene expression was normalized to two reference genes: GADPH and ACTB.

Real time data was analyzed with DataAssist® Software (Applied Biosystems, USA). The data was presented as a mean fold change of relative expression as compared to that seen in control (normalized to 1).

Statistical analysis
The reported data are the means of at least three samples obtained from independent cell cultures. Statistical analysis was carried out by one-way ANOVA using Tukey’s a post test. p values less than 0.05 were considered significant.

RESULTS AND CONCLUSION

GC/MS analysis show that all PS are incorporated into cells, and this is accomplished by a decrease in cholesterol content similar to that obtained with mevinolin treatment.

MTT conversion to formazan and LDH release in the media were appeared reduced in PS supplemented cardiomyocytes compared to controls. Notwithstanding, the expression of genes encoding for SREBP1, SREBP2, HMGC-CoAR, and LDDL is not modified by PS supplementation (excepting for campesterol on HMGC-CoAR expression). The absence of modification in gene expression could be due to the insensitivity of the SSD to PS, or to a too low PS intracellular concentration. Another possibility is that PS concentrate in the membrane and not in the cytosol, where the SSD-mediated regulation take place. Preliminary data confirmed this hypothesis, indicating no increase in PS cytosolic concentration. On the contrary, PS appeared incorporated into the membranes at the expenses of cholesterol. This cholesterol displacement from membranes, particularly mitochondrial ones, could explain the reduction of metabolic activity (measured as MTT conversion observed in PS supplemented cardiomyocytes, in agreement with our previous data [8]). Further studies are needed for the successful understanding of PS molecular effects. This is important also in the light of the suggested long-term relevant PS intake suggested for cholesterol-lowering.

REFERENCES


The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227110: project BetaFood.
Modulation of Antioxidant Enzyme Gene Expression by Pomegranate (Punica Granatum L.) Extract and Punicalagin

Francesca Danesi*, Shikha Saha*, Mark E. Woodcock*, Paul A. Kroen*, L. Filippo D'Antuono*, Alessandra Borioni*

* University of Bologna, Italy; * Institute of Food Research, UK.

INTRODUCTION.

In recent years, the number of scientific papers concerning pomegranate (Punica granatum L.) and its health properties has increased greatly. Among the great variety of chemical components present in the pomegranate, ellagic acid, ellagitannins (including punicalagins); punicalagin, anthocyanins, flavonols, flavan-3-ols, and flavones seem to be the ones responsible, at least in part, for most of the health benefits, which appear mainly related to its antioxidant potential [1]. Pomegranate antioxidant activity could be due not only to a direct scavenging activity, but also to the modulation of the main antioxidant enzymes [2]. To further elucidate the mechanisms of the reported antioxidant activity, HepG2 cells were supplemented with a Georgian pomegranate extract (POME), and then subject to an exogenous oxidative stress. The expression of the gene encoding for the main antioxidant enzymes (superoxide dismutases – SODs; catalase – CAT; and glutathione peroxidases – GPXs) was determined. To compare the biological activity of whole POME extract to its main phenolic component, some cells were supplemented with punicalagin.

MATERIALS AND METHODS.

Pomegranate fruits were collected in Georgia. The methanolic extract was analysed by reversed HPLC. HepG2 cells were supplemented with pomegranate extract (POME) or punicalagin (PUNI) for 24 h, then some cells were exposed to 300 µM tert-butyldihydroperoxide (t-BOOH) for 3 h. SOD-1, 2, and -3; CAT, and GPX1 and -4 gene expression was determined by quantitative real-time PCR. Gene expression was normalized to four reference genes (ACTB, GAPDH, HMBS, and SDHA), selected on the basis of previously published literature [3]. Real time data was analysed with DataAssist Software (Applied Biosystems, USA). Cell viability [4], lactate dehydrogenase (LDH) leakage [5], and cellular lipid peroxidation [6] were also evaluated.

RESULTS.

The HPLC analysis showed a pomegranate-specific fingerprint of polyphenol classes, which include ellagic acid, punicalagin (anomeric isomers A and B), and a large pool of hydrolyzable tannins or polyphenols. In preliminary experiments, POM extract cytotoxicity was assessed in order to select the appropriate concentration to be used in further experiments. HepG2 cells were supplemented with serial dilutions of POM extract. Cell viability dramatically decreased at all POM concentrations but the lowest one, which was therefore used in following experiments. To compare the biological activity of whole POM extract to its main phenolic component, some cells were supplemented with PUNI. Taken together, gene expression data evidence that POME and PUNI had limited and different effects on the transcription of the main antioxidant genes. At present experiments are in progress on the evaluation of the activities of SOD, CAT and GPX enzymes, although supplementation with POM or PUNI did not counteract the effects of t-BOOH, on the contrary enhancing them. In fact, in all cells submitted to the oxidative stress a decrease in cell viability, and an increase in LDH leakage and TBARS level in the medium were detected.

CONCLUSIONS.

Experiments are in progress on the evaluation of the activities of SOD, CAT, and GPX enzymes. From the available data, it is evident that POME does not display any antioxidant activity, while PUNI did not have any antioxidant activity. The water-soluble ellagitannin punicalagin has been reported to be more potent than the water-soluble ellagitannin punicalagin, but although the work of Cerda et al. [7] evidenced no toxicity of pomegranate extracts, the results of this study show that the pomegranate extract is not suitable for use in pharmaceutical formulations.

REFERENCES.


Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227188, project BaseFood. The Authors thank M. Jorjadze from “Eikana” (Georgia) for providing pomegranate fruits.
PROTECTIVE ROLE OF SIDERITIS SCARDICA AND CAMELLIA SINENSIS EXTRACTS IN OXIDATIVELY INJURED MAMMALIAN CELLS

Francesca Danesi 1,a, Shikha Saha 2,a, Paul A. Koon 3,a, Marija Gilbetic 4,a, Aleksandra Komil-Ristic 5,a, L. Filippo D’Antuono 6,a, Alessandra Bordoni 3,a

1 University of Bologna, Italy; 2 Institute of Food Research, UK; 3 Institute for Medical Research, Serbia.

In several countries, tea is the major source of antioxidant flavonoids, and high tea consumption has been associated with many different favourable outcomes. Other plants used for the preparation of herbal teas are source of phenolic antioxidant compounds; among them Sideritis scardica (SS) is used for the preparation of a popular drink (mountain tea) throughout Eastern and Central Europe. In this study the antioxidant effects of a SS extract were investigated in a biological system (HepG2 cells) in basal condition and after the induction of an oxidative stress, and compared to those of a Camellia sinensis (CS) extract and of a well-known antioxidant, α-tocopherol (TC).

Materials and Methods

SS plant material was collected from the South-Western area of the Pirin mountains; the methanolic extracts of dried SS were characterized by HPLC/DAD-MS. Peak identification was performed using data previously reported by Pilejzak-Pichler et al. [1] and Petreska et al. [2]. CS extract was from Indena (Milan, Italy). The in vitro total antioxidant capacity (TAC) of the extracts was assessed using the ABTS method [3]. HepG2 cells were seeded in 6-well plates, 24 h after seeding, the culture medium of HepG2 cells was replaced with fresh one containing 50 μg/ml SS extract or 50 μg/ml CS extract or 20 μM TC. Unsupplemented (US) cells received fresh medium with no added extract. 24 h later, in some cells the medium was discarded and RPMI-1640 medium, containing 300 μM of tert-butyl hydroperoxide (t-BOOH), was added to induce an oxidative insult, while other cells received RPMI-1640 medium without t-BOOH (basal condition). After 3 h, media were removed and collected for further analysis.

Cytotoxicity was assessed via measurements of mitochondrial viability (MTT assay) [4] and lactate dehydrogenase (LDH) leakage in the media [5]. Protection against oxidative stress was verified by the TBARS (thiobarbituric acid reactive substance) assay [6] and by evaluating the cellular TAC [3] and reduced glutathione (GSH) content [7].

Statistical analysis. The statistical difference among treatments was determined by the one-way analysis of variance (ANOVA) with Tukey’s HSD, considering p<0.05 as statistically significant.

Results and Discussion

The total content of phenolics was almost 6 times higher in CS than in SS; accordingly, the TAC obtained for the CS extract was nearly 10 times higher than for the SS extract.

In our experimental conditions SS and CS extracts were not cytotoxic, and supplemented cells showed a higher cellular TAC and GSH content in respect to control cells.

The negative effects of the t-BOOH-induced oxidative stress was clearly indicated by the decrease of cell proliferative activity, by the increase of LDH activity in the medium, and by the increase TBARS content in the medium.

In US cells the oxidative stress did not significantly modify the TAC, which appeared on the contrary increased in all supplemented ones. The GSH level increased in all stressed cells, and to a greater extent in supplemented ones independent of the type of supplementation.

Conclusion

We have demonstrated that a bioactive-rich extract of the mountain tea plant (SS) performs as well in improving cellular antioxidant status as a catechin-rich extract of CS.

Even if SS extract had a lower phenolic concentration and TAC than CS one, their effects in HepG2 cells appeared remarkably similar, suggesting that the protective activity is not limited to catechins.

Based on composition data, we speculate that the active protective components providing activity against t-BOOH are not only catechins but also other phenolic compounds. Although further research is needed to identify SS active component and to evaluate its effects in humans, our data suggest that consumption of S. scardica may have health benefits.


Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118. Project BuSeFood.
Rationale and Objectives. The antioxidant capacity of many commonly consumed fruits and vegetables is well-documented. Many traditional foods of the Black Sea area (BSA) have plant components as main ingredients; nevertheless, their antioxidant properties are not yet well characterized. In the BaSeFood project, we have tested the antioxidant capacity and evaluated the total phenolic content of more than 30 traditional foods of the BSA, generally not yet known by western European consumers. The present work is part of the 7FP BASEFOOD, which aims to revalue traditional BSA foods, representing a potential under-utilised source of positive health promoting dietary components, still neglected by scientific literature.

Materials and Methods. Traditional dishes were prepared in different countries of the BSA (Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine) by local partners, according to the typical recipes, and the seasonal availability of plant ingredients. After preparation, foods were sent to the University of Bologna for analysis. The samples were prepared using an ethanol/water (70:30) extraction procedure [1]. The extracts were evaluated for their antioxidant capacity and phenolic compound content.

The total antioxidant capacity (TAC) was measured using ABTS [2] and DPPH methods [3]. The values obtained for both methods were compared to the concentration-response curve of a standard Trolox solution and expressed as micromoles of Trolox equivalent (TE).

The total phenolic compounds (TPC) were determined at 700 nm using the Folin-Ciocalteu spectrophotometric method according to the guidelines of Singleton et al. [4]. The hydroxycinnamic index (HI) was carried out at 320 nm according to Mailand et al. [5]. The spectrophotometric determination of o-diphenols index (ODI) was carried out as reported in bibliography by Mateos et al. [6]. TPC and ODI were assessed through a gallic acid calibration curve, whereas a ferric acid calibration curve was used to quantify HI. As the moisture content significantly varied among different samples, the bioactivity was calculated on the basis of fresh weight of the original sample.

Statistical analysis. The differences between individual BSA traditional foods, for both the antioxidant capacity and phenolic content, were analyzed by means of Analysis of variance and protected LSD. For the differences between the food categories, the Tukey’s honest significant difference (HSD) test was applied. A multiple regression/path coefficient analysis was carried out to investigate the relations between the two antioxidant capacity methods and phenolic compound content.

Results. Significant differences among samples were detected for all the considered analyses, some foods showed a considerably strong antioxidant response and contained high concentrations of phenolic compounds contents.

With respect to DPPH method, TPC had a high positive effect on TAC, with an almost exclusive direct effect (8). HI also affected TAC, although with only about the half of its correlation depending on a direct effect, and a prominent part of its effect explained by an indirect effect; through its positive relations with TPC. On the other hand, ODI had a significant negative direct effect on the TAC, and its high positive correlation coefficient to TAC was due to an indirect effect, via its high positive correlation with TPC. ODI had no direct positive effect on TAC and its positive correlation coefficient seems to be due to an indirect effect, via its association with the other two indices. All the phenolic compounds had also positive significant correlation coefficients of ABTS method.

However, the contribution in multiple regression (2 coefficients: direct effect) was significant only for TPC and HI. The HI direct effect on TAC was due to an indirect effect, via its high positive correlation with TPC. ODI had no direct positive effect on TAC and its positive correlation coefficient seems to be due to an indirect effect, via its association with the other two indices.

To summarise, the two TAC analyses (DPPH and ABTS) seem to be mainly related to the TPC. In particular, the ODI does not seem to positively affect TAC. HI showed a significant contribution on TAC by DPPH method and a negative effect on ABTS method, in which HI also decreased the TPC effect.

Conclusions. For the first time, the antioxidant properties and the phenolic compounds of traditional foods of the BSA were studied. Although many of these foods are largely consumed with the daily diet in individual Black Sea area countries, less is known about their potential health benefits. Our data, evidencing foods with the highest antioxidant capacity, represent the first step for further researches on their health effects. The nutritional revaluation of traditional foods will be interesting for both consumers, that can discover or rediscover typical dishes, and the food processors. This data can be used to implement and optimise production schemes.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118, project BaSeFood.
Nutrition claims within the EU regulatory context: A potentially important tool for the endorsement of traditional foods of the Black Sea Area Countries.

Introduction. Traditional foods are footprints of the past in the contemporary life of every nation. The advantages linked to traditional foods, often including their beneficial nutritional properties and their historical, social and geographical traits, attract the interest of consumers. At the same time, however, modern lifestyle trends and fast food habits drive people away from their culinary roots. Food labeling plays an important role informing consumers on prudent food choices. The European Commission has recently regulated a framework with which the nutrient content and consequently the health properties of foods may be communicated to the consumer. Since most traditional foods are believed to be healthy, this framework might offer substantial contribution towards sustaining traditional foods in the daily diet. In the context of the BaSeFood project, data are provided on the eligibility of 33 traditional foods from the Black Sea Area to bear nutrition claims according to the EU legislation.

Figure 1: Possible nutrition claims for the Black Sea Area traditional foods investigated in the BaSeFood project

Figure 2: Number of foods, out of 33 traditional foods of the Black Sea Area, potentially eligible to bear each nutrition claim

Methods. Analytical data of a wide range of nutrients were used including energy value, protein, total fat and individual fatty acids fractions, sugars, salt (sodium), dietary fibre, vitamins (B₂, C, A, E and total folicates) and minerals (Fe, Zn and Se). Data were evaluated on the basis of the list of permitted nutrition claims of Regulation (EC) 1924/2006.

Results. The total number of nutrition claims potentially relevant for the 33 traditional foods investigated was 84, while the average number per traditional food investigated for each country ranged between 1.8 and 4.2 (Figure 1). Most frequently suggested claims were related to the sugars and dietary fibre content of the foods, followed with claims on the saturated and total fat content (Figure 2). Claims on the energy, protein and sodium content of the foods were less commonly eligible.

Conclusions. Traditional foods of the Black Sea Area possess several beneficial nutritional properties and are eligible to bear a wide range of nutrition claims based on the EU legislative framework, a fact that may attract the attention of the international food and nutritional community.

Acknowledgements. The present work received support from the European Community’s Seventh Framework Program (FP7, 2007-2013) under grant agreement no. 227118, project BaSeFood

ACUTE EFFECTS OF HOT WATER INFUSIONS OF MOUNTAIN TEA, NETTLE AND DILL ON PLATELET FUNCTION IN SUBJECTS WITH METABOLIC SYNDROME: A RANDOMISED CONTROLLED INTERVENTION STUDY

* Institute of Medical Research, Belgrade, Serbia
† Institute of Food Research, Norwich Research Park, Norwich NR4 7UA, UK
‡ Zhyhronal National University, Zhyhron, Ukraine

Introduction
Platelet hyper-reactivity, often seen in patients with metabolic syndrome, plays an important role in the etiopathogenesis of cardiovascular diseases (CVD), which imposes platelets as one of putative targets of food bioactive compounds action in CVD prevention. The aim of the study was to investigate the acute effects of hot water infusions of mountain tea, nettle and dill, traditional dietary plants of Black Sea region rich in polyphenols, on different markers of platelet function. Study was conducted as a single-blind, randomized, controlled intervention trial.

Material and methods
After a 2-week run-in period with a low intake of polyphenols-rich foods, 88 participants with metabolic syndrome (ATP III criteria) were randomly assigned into 1 of 4 intervention groups. Participants consumed a meal that included single portion of hot water infusion (200 ml) made of dried mountain tea, nettle or dill (2g) and 50g of white bread or 210 ml of hot water with white bread as control meal. Blood samples were collected at baseline and 2h after the intervention. Study design scheme is shown in Figure1. Markers of platelet activation expression of P-selectin and GPibbeta or aggregators (with monocytes and neutrophils) were evaluated using whole-blood flow cytometry, in basal conditions (without agonists), or after ex vivo action of agonists (0.5μM ADP, 20 μM ADP, 250 μM arachidonic acid (AA), or 250 μM arachidonic acid (AA) with 65 μM acetyl salicylic acid). List of evaluated parameters is shown in Figure 2.

Results
Statistical descriptors of the obtained data are shown in Table 1. Results of the statistical analysis using non-parametric test 2- independent samples and assumed significance as output is shown in Table 2. Data obtained indicated that one portion of mountain tea hot water infusion significantly decreased P-selectin expression in basal conditions (p<0.05) and induced by ex vivo treatment with 20 μM ADP (p<0.05), compared to the control. It also aggravated ex vivo inhibitory effects of acetyl salicylic acid on platelet-monocyte aggregation induced by AA (p<0.05). Acute consumption of dill hot water infusion decreased P-selectin expression in basal conditions and after 20 μM ADP (p<0.05), but increased platelet-neutrophil aggregation in basal state and after 20 μM ADP (p<0.05). Hot water extract of nettle decreased P-selectin expression after 20 μM ADP (p<0.05), and was the only intervention that decreased expression of GPibbeta in basal state (p<0.05) and after AA action (p<0.05), compared to the control.

Conclusion
Obtained data indicate that even single portions of investigated polyphenol-rich plant food could influence some markers of platelet function and their potential in reducing pathologically increased platelet propensity for activation and aggregation should be further evaluated.

Table 1. Statistical descriptors of the obtained data

Table 2. Results of the statistical analysis using non-parametric test 2- independent samples and assumed significance as output

Acknowledgments: The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227188, project BZFOod
**INTRODUCTION**

Pomegranates are thought to contribute to the cardio-protective effects of a diet rich in fruits and vegetables. How pomegranates exert this protective effect is not clearly understood but research has focused on their potential to modulate platelet function. For example, there are several reports of human intervention trials with polyphenol-rich foods such as cocoa and cranberries that, in vitro assessments with isolated compounds, such as quercetin, in which reductions in platelet aggregation have been shown.

The aim of this study was to investigate the effects of extracts of bioactive-rich plant foods typical of the Black Sea region and isolated bioactive metabolites of these plants, on platelet activity.

**SUBJECTS AND METHODS**

Bioactive-rich plant materials, *Sellersia scabrosa* (‘mountain tea’), *Umbilicus saxosus* (annual nettle), and *Pistacia terebinthus* (tobacco), were chosen from defined locations of the Black Sea region. Bioactive-rich extracts were obtained from freeze-dried plant materials using 70% methanol (see paper by Basha et al for full details). The isolated bioactive metabolites were either purchased or synthesised at the Institute of Food Research, UK.

15 subjects donated whole blood samples to investigate the anti-platelet effects of:

1. Methanol extracts of the 6 plant materials described above, each dissolved in DMSO to a final concentration of 100 μg/ml (n=10 subjects).

2. Isolated bioactive metabolites dissolved in DMSO as follows: a) a mix of the predominant human plasma metabolites of the flavonoid quercetin (quercetin-3-gluc, 3’-methyloxy-quercetin-3-gluc, 5, 20, and 100 μg/ml each) and b) sulphoraphane and sulforaphane cysteine: 2 and 20 μg/ml (n=5 subjects).

Platelet function was assessed using a platelet function analyser (PFA-100 – Dade Behring) which simulates in-vitro platelet aggregation and aggregation that occurs following vascular injury.

Whole blood drawn from subjects into 3.2% buffered sodium citrate tubes, were tested for 30 min before incubation for a further 30 min with each of the methanolic extracts and isolated plasma metabolites described above.

![Image of platelet function analyser](image)

Treated samples (800 μl) were plated into von Willebrand (vW) cuvettes (100 μl) and washed with CEPI/CAPD (CARP-3D) cartridges and inserted into PFA-100.

![Image of platelet function analyser](image)

Treated samples were processed alongside negative control samples (DMSO only) and positive control samples (ASA and aspirin). Treated-platelet-free analyses were performed to be effective in prolonging CEPI and CAPD-CT, respectively.

**RESULTS**

1. Effect of positive control chemicals on platelet activity

In the majority of subjects treatment of whole blood with the positive control chemicals (ADP-induced closure) and ASA aspirin-induced closure resulted in non-clotting (i.e. maximal platelet inhibition).

2. Effects of bioactive-rich plant food extracts on platelet activity

Changes in CEPI and CAPD-induced CT in response to treatment with bioactive-rich plant food extracts were measured relative to the negative control sample (Fig. 2). CEPI-induced CT after treatments with pomegranate, pomegranate and lake were increased by 2.3, 4.3, and 4.2%, respectively, but the effects were not significant. Conversely, CAPD-induced CT was shortened for 5 out of the 6 extracts which was significant for lake and stil (p<0.018).

**CONCLUSIONS**

These data show that some of the six bioactive-rich plant extracts containing various flavonoids, glucosinolates and other bioactive compounds effectively increased CT in the PFA-100 model for assessing platelet function. Further, none of the human metabolites of polyphenols such as quercetin and sulforaphane were effective in increasing CT in the PFA-100. This strongly supports the concept that consumption of these plants/bioactives is not likely to induce beneficial changes in platelet function in humans.

**REFERENCES**


Selected Traditional Foods from Georgia in the Frame of BASEFood Project

Mariam Jorjadze a, Tania G. Albuquerque b, Ana Sanches-Silva b, Paul Finglas c, Elene Shatberashvili a, Zaza Kiasonia a, La Ebralidze a, V. Dillis d, Effie Vasilopoulou e, L. Filippo D’Antuono f, Helena S. Costa b

a Elana, Biological Farming Association, Tbilisi, Georgia; b Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, I.P., Lisbon, Portugal; c Institute of Food Research, Norwich Research Park, Colney, Norwich, United Kingdom; d Hellenic Health Foundation, Athens, Greece; e Department of Hygiene, Epidemiology & Medical Statistics, Medical School, University of Athens, Greece; f Campus of Food Science, Cesena, University of Bologna, Italy

E-mail: tania.albuquerque@ihsa.mim-.saude.pt

Georgia is a small country in the Caucasus which has a variety of regions, which differ greatly from each other. The Georgian cuisine is specific of the country, but it also contains some influences from other Middle Eastern and European culinary traditions, as well as those from the surrounding Western Asia. The cuisine offers a variety of dishes with various herbs and spices. This study was carried out within BASEFood project (Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods) and the aim was to determine the nutritional composition of five traditional foods from Georgia [1].

### Traditional Food

- **Tsiteli dol bread**
  - **Makhobeli**
  - **Doli puri**
  - **Food Description**: A light blue tinged bread of oblong or oval shape, containing a small amount of flour makhobeli
  - **Nutritional Composition**: The energy value for the analysed traditional foods varied between 193 kJ/45 kcal and 3758 kJ/899 kcal, for wild plum sauce and flax oil, respectively.
  - **Nettles with walnut sauce**
  - **Chinchrish mkhall nigvzit**
  - **Food Description**: A meal of boiled stinging nettle seasoned with walnut
  - **Nutritional Composition**: Nettles with walnut sauce have the highest total protein content (5.56 ± 0.26 g/100 g).
  - **Churchkhela**
  - **Churchkhela**
  - **Food Description**: A delicacy made of walnuts sewn onto a string, dipped in thickened grape juice, and dried in the shape of a sausage
  - **Nutritional Composition**: Besides the oil, the analysed traditional foods with the highest fat content were churchkhela and nettles with walnut sauce, mainly due to walnuts which is present in both recipes.
  - **Flax oil**
  - **Selis zeti**
  - **Food Description**: Pressed oil (Lincum usitatissimum L.)
  - **Nutritional Composition**: Flax oil is mainly composed by unsaturated fatty acids (78.8 g/100 g).
  - **Wild plum sauce**
  - **Tkhemis satsasebi**
  - **Food Description**: A well seasoned wild plum sauce
  - **Nutritional Composition**: The highest starch and total dietary fibre concentrations (1.1 ± 0.16 g/100 g and 5.59 ± 0.34 g/100 g, respectively) were found for Tsiteli dol bread.

### Acknowledgements

New data on nutritional composition of Georgian traditional foods will enhance the knowledge base on traditional foods which is necessary for the development of exploitation plans and will be useful for their promotion.

### References

The research leading to these results has received funding from the European Community’s Seventh Framework Program [FP7/2007-2013] under grant agreement no 20184.
EFFECTS OF 6-WEEK-OF POMEGRANATE JUICE CONSUMPTION ON PLATELET FUNCTION IN SUBJECTS WITH METABOLIC SYNDROME: A RANDOMIZED CONTROLLED INTERVENTION STUDY

Aleksandra Konić-Ristić, Maria Glibetić, Tatjana Srdić-Rajić, Nevena Kardum, Marija Ranić, Paul A. Kroon, Wendy Hollands

3 Institute of Medical Research, Belgrade, Serbia
4 Institute of Food Research, Norwich Research Park, Norwich NR4 7UA, UK

Introduction
Numerous epidemiological studies suggested a positive correlation between "disturbances" in platelet phenotype and other markers of platelet function with traditional risk factors for cardiovascular diseases. With the established role of thrombosis and atherosclerosis, hyperactive platelets became a suitable target for both primary and secondary prevention of CVD. Human in vitro and ex vivo studies showed that dietary extracts and compounds can modulate platelet functions. These findings rationalize the investigation of anti-platelet effects of pomegranate juice, traditional food of Black Sea area countries, as one of the proposed mechanisms in CVD prevention, in addition to other beneficial effects of pomegranate bioactives. The aim of the study was to investigate the effects of 6-week pomegranate juice consumption on markers of platelet function in subjects at high risk for CVD. The study was conducted as a single-blind, parallel, randomized, controlled intervention trial.

Material and Methods.
After a 2-week run-in period with a low intake of polyphenols-rich food, 50 participants with metabolic syndrome (ATP III criteria) were randomly assigned into one of two intervention groups and asked to consume restricted (low-polyphenol) diet supplemented with 330 ml/day of pomegranate juice or a restricted diet for 6 weeks. Baseline characteristics of the participants are shown in Table 1.

Blood samples were collected at baseline and after the intervention. Study design scheme is shown in Figure 1. Markers of platelet activation (expression of P-selectin and GPIIb/IIIa antigens on platelet surface) or aggregation (with monocytes and neutrophils) were evaluated using whole-blood flow cytometry, in basal conditions (without agonists), or after ex vivo action of ADP, as agonist in suboptimal (0.5μM) and optimal (20μM) concentrations. Representative dot-plots for activation and aggregation are shown in Figure 2.

Results
Obtained data for percentage of platelets positive for one of the evaluated markers (CD62P or GPIIb/IIIa) in intervention and control group before and after the treatment period are shown in Figure 3, in a form of box-plots. Figure 4 presents the data on percentage of platelet-monocyte or platelet-neutrophil in the population of granulocytes of interest. Statistical significance (p<0.05) of the difference from the baseline values within each treatment group is evaluated using T-test of paired samples and the obtained results are shown in Table 2.

Effect of treatment compared to the control was evaluated using general linear mixed-effects models for repeated measures for two factorial analysis of variances (effects of treatment between the groups) and the obtained results are shown in the Table 3. According to the results presented P-selectin expression (analyzed as % and MFI) was significantly decreased after the intervention, compared to the control group in basal conditions (p<0.01 and p<0.05, respectively), and after ex vivo treatment with suboptimal ADP concentration (p<0.01 and p<0.01). Percentage of GPIIb/IIIa positive platelets and the intensity of the antigen per platelet were also decreased after the intervention, with ex vivo agonist in suboptimal (p<0.001) and optimal concentrations (p<0.001).

Platelet-neutrophil aggregation was not influenced by the pomegranate dietary intervention.

Conclusions
Obtained data indicate that pomegranate juice supplementation for 6-weeks significantly decreased parameters of platelet activation in subjects at high risk for CVD. Further studies should investigate more precise mechanism and bioactives or metabolites responsible for the observed effects.

Table 1. Subject characteristics and blood parameters screening

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>53±5</td>
<td>54±6</td>
</tr>
<tr>
<td>Gender (%)</td>
<td>52M:48F</td>
<td>51M:49F</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td>32±5</td>
<td>33±6</td>
</tr>
</tbody>
</table>

Table 2. Parameters significantly changed as a result of treatment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD62P %</td>
<td>0.95±0.01</td>
<td>0.90±0.02</td>
</tr>
<tr>
<td>CD62P MFI</td>
<td>0.01±0.00</td>
<td>0.00±0.00</td>
</tr>
<tr>
<td>GPIIb/IIIa</td>
<td>0.95±0.01</td>
<td>0.94±0.01</td>
</tr>
<tr>
<td>GPIIb/IIIa MFI</td>
<td>0.02±0.00</td>
<td>0.01±0.00</td>
</tr>
</tbody>
</table>

Table 3. Effect of treatment compared to the control evaluated using general linear mixed-effects models for repeated measures for two factorial analysis of variances

<table>
<thead>
<tr>
<th>Intervention Difference compared to the baseline</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD62P %</td>
<td>0.000</td>
</tr>
<tr>
<td>CD62P MFI</td>
<td>0.000</td>
</tr>
<tr>
<td>GPIIb/IIIa</td>
<td>0.000</td>
</tr>
<tr>
<td>GPIIb/IIIa MFI</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Acknowledgments: The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 22718, project BeSeFood.
SELECTED TRADITIONAL FOODS FROM RUSSIAN FEDERATION
IN THE FRAME OF BASeFood PROJECT


* State Educational Institution of the High Professional Education "Moscow State University of Food Productions", Russian Federation; 1 Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, I.P., Lisbon, Portugal; 2 Institute of Food Research, Norwich Research Park, Colney, Norwich, United Kingdom; 3 Department of Hygiene, Epidemiology & Medical Statistics, Medical School, University of Athens, Greece; 4 Hellenic Health Foundation, Athens, Greece; 5 Campus of Food Science, Cesena, University of Bologna, Italy

E-mail: helena.costa@insa.min-saude.pt

Russian Federation traditional foods are part of the cultural heritage. Some of them, unfortunately, are almost forgotten, and their recipes are preserved only in old cookbooks. Others are prepared only in some regions of Russia. However, some traditional foods are still part of the usual dietary patterns of most Russians. The latter include buckwheat porridge and, to a lesser extent, kvass and okroshka, for which consumption increases significantly in the summer.

This work aims to determine the nutritional composition of five traditional foods from Russian Federation that have been prioritised in the frame of the BASeFood project (Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods).[1]

TRADITIONAL FOOD | FOOD DESCRIPTION | NUTRITIONAL COMPOSITION

- Buckwheat porridge, crumbly
  - A moist, non-agglomerated, laver-type dish made from buckwheat flour.

- Kvass southern
  - A fermented, alcoholic beverage made from rye bread and juniper berries.

- Watermelon juice
  - A refreshing beverage made from watermelon.

- Mustard oil
  - A yellow oil with a spicy taste derived from mustard seeds.

- Vegetable okroshka
  - A cold soup with shredded vegetables and bread kvass. A light brown liquid, served at a temperature not exceeding 14°C.

The energy values for the analysed traditional foods varied between 18.6 kcal and 376 kcal for buckwheat porridge, crumbly, 92.2 kcal for kvass southern, and 98.7 kcal for vegetable okroshka.

From the five selected Russian traditional foods, four contain mainly water (66.6 ± 0.03 g/100 g for buckwheat porridge, 92.2 ± 0.02 g/100 g for kvass southern, and 98.7 ± 0.03 g/100 g for vegetable okroshka).

The food with the highest monounsaturated fatty acids content was mustard oil (55.1 ± 0.68 g/100 g), and it also has a high polyunsaturated fatty acids content (38.0 ± 0.56 g/100 g).

Buckwheat porridge, crumbly has a significant amount of available carbohydrates (about 24%) and about 5% of total dietary fibre because it is prepared with buckwheat. For watermelon juice, the available carbohydrates are mainly sugars (64.3 ± 0.14 g/100 g). All results are given per 100 g edible portion.

ACKNOWLEDGEMENTS

New data on nutritional composition of Russian traditional foods will enhance the knowledge base on traditional foods which is necessary for the development of exploitation plans and will be useful for the promotion.

REFERENCES

Effects of 6 Weeks of Pomegranate Juice Consumption on Cardiovascular Disease Risk Biomarkers in Subjects with Metabolic Syndrome: A Randomized Controlled Intervention Study

Nevena Kardum a, Aleksandra Konči-Ristić a, Maria Gibetić a, Tatjana Srdić-Rajić a, Paul A. Kroon b, Wendy Hollands a, Woodcock Mark a, Nadiya Boyko a

a Institute of Medical Research, Belgrade, Serbia; b Institute of Food Research, Norwich Research Park, Norwich NR4 7UA, UK

Introduction

Pomegranate juice, a traditional food of Black Sea Region, is promising source of health-promoting bioactive compounds, mainly polyphenols, with numerous proposed health effects. Several studies investigated the effects of pomegranate juice in cardiovascular diseases prevention (CVD) based on the influence of pomegranate bioactives on endothelial function including effects on nitro-oxide levels and activity, effects on redox balance, oxidative modifications of lipids and proteins, anti-inflammatory action and effects on cells directly involved in CVD pathogenesis (monocytes, platelets, macrophages). Some studies also indicated that pomegranate juice consumption could be effective in reducing traditional risk factors for CVD (hypertension, hyperlipidemia, high pressure, obesity) often associated with each other and defined as metabolic syndrome. The main goal of this study is investigation effects of 6-week of pomegranate juice consumption on cardiovascular disease risk biomarkers in subjects with metabolic syndrome.

Material and methods

The study was conducted as a single-blind, parallel, randomized, controlled intervention trial. After a 2-week run-in period with a low intake of polyphenol-rich food, 50 participants (29 women and 21 men) aged 35 to 65 with metabolic syndrome (ATP III criteria) were randomly assigned into one of two intervention groups and asked to consume restricted (low-polyphenol) diet supplemented with 350 ml/day of pomegranate juice or a restricted diet without supplementation for 6 weeks. Baseline characteristics of the participants are shown in Table 1. Blood samples were collected at baseline and after the intervention (day 42) and analysed for traditional biochemical and anthropometric parameters of CVD risk.

Blood samples were collected at baseline and after the intervention. Study design scheme is shown in Figure 1. Markers of platelet activation (expression of P-selectin and GP Ib/IIa antigens on platelet surface) or aggregation (with monocytes and neutrophils) were evaluated using whole-blood flow cytometry. In baseline conditions (without agonists), or after ex vivo action of ADP or agonist in suboptimal (0.5 μM) and optimal (20 μM) concentrations. Representative dot-plots for activation and aggregation are shown in Figure 2.

Conclusion

Obtained results showed that pomegranate juice could have beneficial effects on some of the CVD risk factors, but further studies should confirm if these effects are sufficient for the prevention of CVD or beneficial effects of pomegranate could directly target cells and tissues of cardiovascular system (endothelial cells, macrophages, platelets) and on this level prevent harmful effects of traditional risk factors.
Development of a national food composition database in Ukraine following EuroFIR and BaSeFood projects

Nelya Koval1, Andriy Pauk1, Larysa Buhyna1, Helena S. Costa2, Tânia G. Albuquerque1, Ana Sanches-Silva1, Jenny Plumb1, Mark Roe1, Paul Finglas1, Maria Gilbetic1, Nadiya Boyko1

1 Lutsk National University, Ukraine; 2 Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, LFTP, Lisbon, Portugal.

Introduction. Food composition databases (FCDB) are an important resource of nutritional composition data which is essential for the assessment of nutritional status, at individual, regional and international levels. The European Food Information Resource (EuroFIR) is the world-leading European Network of Excellence on Food Composition Databank systems. This project aimed to develop and integrate a comprehensive, coherent and validated databank providing a single, authoritative source of food composition data in Europe. EuroFIR has designed and implemented a process for the identification, prioritisation, collection and analyses of traditional foods, using a common methodology for European countries. These approaches have been further extended in BaSeFood project which aims to promote sustainable development and exploitation of traditional foods of plant origin containing emerging bioactive compounds with putative health effects in the Black Sea region. The aim of this work is to contribute for a new FCDB in Ukraine based on these quality standards with the compilation of a selected range of traditional foods.

Prioritized foods of plant origin from Ukraine by categories:

- Cereals: Sour rye bread
- Vegetables: Transcarpathian green borscht
- Fruits: Uvar
- Oils: Roasted sunflower seeds
- Herbs, spices: Cottage cheese with dill and garlic
- Fermented food and drinks: Sauerkraut

Results. Following these methodologies, 53 traditional foods were prioritised and documented including information on food description, traditionally composition and consumption data. This information was collected for each of the traditional foods for further inclusion in the Ukrainian national food composition database.

From these, 6 foods (rye bread, Ukrainian red borsch with beets, Transcarpathian green borscht with sourdough, cottage cheese with dill and garlic, sauerkraut and roasted sunflower seeds) were analysed for nutritional composition. The following components were quantified for each food: moisture, ash, total nitrogen (for protein), total fat, individual fatty acids, starch, total sugars and dietary fibre, vitamins, minerals and trace elements.

Following a training, Ukrainian compilers have earned the skills to carry out the compilation of traditional foods with EuroFIR requirements. A total of 53 Ukrainian traditional foods have been indexed according to Langua. Thesaurus (http://www.langua.org/), Langua provides an international framework for food description using a system of controlled vocabularies.

Conclusions. The EuroFIR and BaSeFood standardised procedures have been implemented in a pilot study to be further extended to other foods for development of an Ukrainian FCDB.

Acknowledgements. This research funding to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227115, project BaSeFood.
Beneficial Microorganisms of Traditional Foods of Black Sea Region and their potential implementation

Olga Levchuk, Viktoria Bati, Viktor Petrov, Nataliya Markush, Tana Sapundieva, Iordanca Alexieva, Mariam Jorjasze, Carmen Costea, Dmytro Karpenko, Osman Hayran, Bike Kocaoglu and Nadiya Boyko

Introduction. Ethical cuisine and their major plant components are potential source of the original sourdough. It is little known of beneficial microorganisms isolation in plant originated traditional foods of countries of Black Sea region (BSAC).

Results. Locally produced original national fermented products of BSAC were rich source for beneficial microorganisms. L. casei originated from Russian rye bread Kvass inhibited S. enterica found in patients with toxic infectious colitis. L. delbrueckii demonstrated high antibacterial properties against methicillin resistant S. aureus (MRSA) and St. millis obtained from preschoolers with caries combined with symptoms of gastrointestinal disorders. L. casei and L. delbrueckii found in Ukrainian Sauerkraut are active against the agents of nosocomial infections: E. cloacae, K. pneumoniae and ESBL-producing EPEC. E. coli. Association of beneficial microorganisms from Bulgarian bosca and Romanian secata (L. casei / L. plantarum, L. fermentum, L. acidophilus, B. longum, A. isaaci / L. delbrueckii, B. breve / L. acidophilus, B. longum, C. pellucidae) is not affecting significantly on any of tested potentially pathogenic bacteria being able at the same time stimulate local immune response in BALB/c mice following oral administration of such cocktail. C. famata obtained from Turkish Sautéed pickled green beans was specifically active in utilization of cellulose and can be potentially involved in regulation of stool formation in patients with irritable bowel syndrome.

The synergistic antimicrobial activities of plant extracts and beneficial microflora are useful novel tools in prevention and treatment of variety of human and farm animal infectious and somatic diseases.

Antibacterial properties (inhibition zones, mm) of L. delbrueckii and L. casei (1/2)

Potential candidates for novel antimicrobial biological compositions: co-culture with pathogens

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (2007-2013) under grant agreement n. 227116, project Basefood.

---

**Notes:**
- Lactic acid bacteria (LAB) are known to produce antibacterial compounds that have been tested in clinical studies. Efficacy of complex preparation for prevention and treatment under certain conditions has been proved in rural clinical experiments with patients. Further studies are required to explore wider practical implementation of our results in food technology, veterinary and marine products.
- The food and meat industry is an important factor in the global economy and is subject to strict regulations. All selected microorganisms and plant extracts demonstrate potential for application in the food industry, especially in the production of probiotic and prebiotic foods.
- The results of the study have potential implications for the development of new food products and treatments for gastrointestinal disorders.
**Aim.** To investigate the ability of selected food extracts/active components from BSAC traditional foods to modulate and regulate host immune defences on animal and DCs models.

**Specific objectives.**
1. Changes in gut microbial homeostasis in response to the treatments.

**“HOT METHANOL” EXTRACTS of...**

Mice were fed orally for 16 days with...

- Pomegranate
- Nettles
- Olive leaves
- Tangerine
- Carrots
- Onions
- Garlic
- Red bell pepper

**DENDRITIC CELLS WERE EXPOSED FOR 8 AND 14 HOURS...**

**IN VIVO**

- IL-17A; II-1; II-10; II-12; TNF-α

**IN VITRO**

- IL-4; IL-10 dendritic cell (DC)
- IL-17A; II-1; II-10

**FACs and ELISA**

**RESULTS**

- IL-17A; II-1; II-10
- IL-12; TNF-α

**CONCLUSION**

- The use of mouse and rat appropriate models to define the health impact of plants’ extracts that are major ingredients of traditional foods of BSAC.
- On mouse model we were able to show that Kale, Nettles, Pomegranate, Sideritis, and Dill differently altered gut microbial representatives. In mice, the most effective species were Bifidobacterium (pre-regulated) and opportunistic pathogenic bacteria (Staphylococci and Enterobacter) (down-regulated).
- On mouse models we had demonstrated that both systemic and local immune responses were altered in plant-specific manners.
- DCM models were useful to define the ability of tested plant’s extracts induce pro- or anti-inflammatory responses.
- Profiles of cytokines assessed in serum, FC and supernatants of DC-stimulated DCs are well prognostic and evaluating the corresponding "direction" of all the following model and found host immune responses.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 207116, project BaSeFood.
The use and extension of eBASIS bioactives database by BaSeFood

What is eBASIS?
• Database on plant-based bioactives
• Quality assessed data from peer reviewed literature
• Composition and biological effects data
• Research resource for scientists, epidemiologists, food regulatory authorities and food industry professionals

Applications of eBASIS
• Nutrition and health claim substantiation
• Calculations of exposure to bioactive compounds
• Development of new food products
• Risk assessment of food and food plant products
• Assessment of GM plants

Use of eBASIS for BaSeFood
• Search eBASIS for quality assessed peer-reviewed data on bioactive composition on traditional foods of the Black Sea Area
• Used for prioritisation of compounds for analysis for plant ingredients in traditional foods

Extension of eBASIS by BaSeFood
• Addition of new foods into eBASIS: Cherry Laurel, Elderflower, Nettle. Scientists used as traditional food ingredients
• Literature search for composition data on bioactives in the newly added foods
• 37 peer reviewed articles sourced containing data for quality assessment and entry into eBASIS
• Providing an improved resource on composition data on food plant ingredients in the Black Sea Region

Features of eBASIS
• Data on approximately 200 beneficial and 90 toxic bioactive compounds, such as phytosterols, isoflavones, glycoalkaloids and xanthine alcohols
• Listing of major 300 European food plants and translation of common names into 15 European languages
• Internet-deployed, user-friendly database, easily downloadable reports in chosen formats
• Search for composition data via individual compound, plant food or a combination of food and compound
• Search for bio-effect information via one or a combination of compound, food, biomarker and study type
• Advanced search for individual reference details and further information on specific data sets as well as retrieval of supplementary information on compound classes

For further information:
http://ebasis.eurofir.org

Paul Finglas, IFR, Norwich, NR4 7UA, UK: paul.finglas@ifr.ac.uk
Stevne Bell, EuroFIR AISBL: sb@eurofir.eu

The authors acknowledge all partners in the BaSeFood Project

This work was prepared on behalf of BaSeFood and funded under the EU 7th Framework (GA n° 227118)
THE POTENTIAL OF TRADITIONAL FOODS FROM BLACK SEA AREA AS SOURCE OF VITAMINS AND BIOACTIVE COMPOUNDS


*Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, I.P., Lisbon, Portugal; 1-Institute of Food Research, Norwich Research Park, Colney, Norwich, United Kingdom; 2-Department of Hygiene, Epidemiology & Medical Statistics, Medical School, University of Athens, Greece; 3-Helena Health Foundation, Athens, Greece; 4-Université of Food Technologies, Paralia, Bulgaria; 5-Unichem National University, Unichem, Ukraine; 6-HAS Bucharest, Romania; 7-Technical University, Istanbul, Turkey; 8-Tbilisi Biological Farming Association, Tbilisi, Georgia; 9-Odessa National Academy of Food Technologies, Odessa, Ukraine; 10-State Educational Institution of the High Professional Education “Moscow State University of Food Productions”; Russian Federation; 11-Campus of Food Science, Cesena, University of Bologna, Italy.

E-mail: helena.costa@isa.mln-sarde.pt

INTRODUCTION

In the last years, great attention has been devoted to the study of bioactive compounds in order to prevent or delay the onset of chronic diseases. This work aims to study the carotenoid, vitamins and total fat content of the traditional foods from Black Sea Area countries (BSAC) that have been prioritised in the frame of the BaSeFood project [1].

BLACK SEA AREA SELECTED TRADITIONAL FOODS

RESULTS AND DISCUSSION

- The traditional food from BSAC with higher concentration is vitamin B6, from total fats was coated sunflower seeds (6.19 ± 0.02 mg/100 g, 6.0 ± 1.08 mg/100 g and 10 μg/100 g of edible portion, respectively).
- Only 5 foods have a vitamin C content above the limit of quantification, with fruit of the evergreen cherry laurel (65 mg/100 g of edible portion) having the highest content.
- From the analysed BSAC foods, 12 (68%) contained lycopene. The foods with highest lycopene content were watermelon juice, seeded pickled green beans and watercress leaves, 1.76 ± 0.3 and 1.01 ± μg/100 g of edible portion, respectively.
- Pickled green beans presented the highest α-carotene content (1877 ± 14.8 mg/100 g of edible portion).
- Among the analysed traditional foods, 15 (84%) contained x-carotene. The highest x-carotene content (300 ± 2.6 μg/100 g of edible portion) was found in plum jam.

CONCLUSIONS

Despite the great variability on the content of carotenoids and vitamins, most of the analysed traditional foods from BSAC can be considered good sources of these health promoting compounds.

REFERENCES


ACKNOWLEDGMENTS

The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement 227986.
Introduction

Atherosclerosis is a major cause of inflammatory disease and is regarded as an inflammatory disease which is associated with an increased expression of cellular adhesion molecules (CAM) such as intracellular adhesion molecule-1 (ICAM-1) and vascular cell adhesion molecule-1 (VCAM-1) on the surface of endothelial cells at the vascular wall. Circulating leukocytes, such as the monocyte, can adhere to the vascular wall at sites of increased CAM expression where they can transmigrate into the sub-endothelial space. Once inside the sub-endothelial space monocytes can differentiate into macrophages which form foam cells leading to the development of atherosclerotic plaque [1]. Previous studies have shown that isolated polyphenols and polyphenol-rich diets can reduce the expression of adhesion molecules in cultured cell [2] and animal models [3].

The purpose of this study was to assess the ability of polyphenol-rich extracts of plants from the Black-Sea region (dill, dill, pomegranate and Sideritis scordia) to attenuate TNFα-induced increases in surface expression of ICAM-1 & VCAM-1 on human umbilical vein endothelial cells (HUVEC). In addition we examined the ability of the anthocyanins cyanidin-3-glucoside (Cy-3-Glc) and delphinidin-3-glucoside (Del-3-Glc), the anthocyanidins cyanidin (Cy) and delphinidin (Del) and their metabolites prodelphinidin acid (PA) and gallic acid (GA) to modulate TNFα-induced expression of CAM-1 & VCAM-1 in HUVEC.

Methods

- HUVEC were grown to confluence in 6-well culture plates and incubated for one hour with varying concentrations of the plant-extracts or with 20µM of Cy-3-Glc, Del-3-Glc, Cy, Del, PA or GA. Quercetin (10µM), which has previously been shown to attenuate TNFα-induced increases in HUVEC ICAM-1 and VCAM-1 expression was used as a positive control.
- HUVEC were challenged with 10ng/ml TNFα and incubated for 16h.
- HUVEC were detached from culture plates and incubated with anti-ICAM-1 or anti-VCAM-1 PE-conjugated antibodies.
- HUVEC surface was assayed by flow-cytometry.

Results

Fig 1 (A-D) shows the effects of the plant-extracts on TNFα induced ICAM-1 expression in HUVEC. A trend toward a reduction in ICAM-1 expression was observed for all extracts, but this was not statistically significant. None of the other extracts were able to significantly alter TNFα-induced increases in ICAM-1. Quercetin treatment (Fig 1E) reduced TNFα-induced expression of ICAM-1 by 59% (p=0.001).

Conclusions

The data presented here indicate that neither bioactive-rich extracts of dill, settle, Sideritis and kake, nor anthocyanins and their metabolites, inhibit the surface expression of cellular adhesion molecules on vascular endothelial cells in vitro. These results indicate that the potential cardiovacular health benefits associated with the consumption of these foods probably occur via other mechanisms.

References:
Compounds and mechanisms responsible for the in vitro release of nitric oxide in endothelial cells treated with a phenolic-rich pomegranate extract

Mark Woodruff1, Mariam Jorjazde2 and Paul Kroon2

1Food and Health ISP, Institute of Food Research, Norwich, NR4 7UA, UK; 2ELKANA – The Biological Farming Association, Gazakhul St., G177, Tullis, Georgia. *Corresponding author: mark.woodruff@ifr.ac.uk

Background

1. Endothelial Function
   - Good endothelial function is important for healthy arteries and helps to prevent cardiovascular disease (CVD) - responsible for more global deaths than any other cause.
   - Endothelial dysfunction is associated with a number of functional changes, such as decreased dilatory response (vasodilation).
   - Diet with high fat and vegetable intake has shown to lower CVD risk. How?
   - Foods may help maintain vascular health through a high bioactivity content, by affecting endothelial cell signalling.

Method

1. Cell culture model
   - HUVECs (human umbilical vein endothelial cells) are a commonly used model for the vascular endothelium.

2. Preparation of pomegranate extract
   - Pomegranate nrs (3 parts) were blended before incubation with 70°C medium (7 parts) for 20 minutes.
   - Liquid cooked centrifuged, filtered and reconstituted under vacuum.
   - Solid material crushed up to make a homogenous extract (PHEX).
   - PHEX was used to determine total phenolic content of extract, measured in mg gallic acid equivalents (GAE).
   - HUVECs were treated with PHEX and effects on endothelial vasodilatory factors were determined.

3. Analysis of Nitric oxide related signalling molecules
   - Phosphorylated (p-Akt) and p-NOS in HUVECs treated with PHEX were measured using western blotting techniques, using phospho-antibodies against Akt (Ser473) and NOS (Ser1177).
   - Total PTH cell counts were determined using CCK-8 cell viability assay.

4. Mechanism of pomegranate polyphenols on nitric oxide upstream from Akt
   - pAkt increases by 75% in either: (i) nitric oxide (NO) in HUVECs treated with PHEX; (ii) increased NO production (NOx) in treated cells versus untreated cells.
   - NOx is produced by the enzyme NO synthase (NOS), which is increased in response to PHEX treatment.

5. Analysis of polyphenols in the pomegranates extract
   - Fatty-acid- and phenol-rich HPLC used to analyse the pomegranate extract.

6. Fractionation of extract
   - The extract was separated into fractions, in leading series C-18 solid phase extraction column.
   - The active (antioxidant) fractions were then used to test the bioactivity of the fractions.

Results

1. Activation of Akt and sNOS
   - p-Akt increased after incubating HUVECs with 100 µg/mL of PHEX for the indicated time periods.
   - p-NOS increased after incubation of HUVECs with indicated doses of PHEX for 60 minutes.
   - Incubation of HUVECs with PHEX for 24 hours caused a significant (p < 0.01) decrease in total p-NOS content and sNOS activity.

2. Compounds responsible for ProgX bioactivity
   - Fructose (Fru-A, B, and C) all induced p-Akt – strongest response from B (progeny fraction).

3. Mechanism of pomegranate polyphenols bioactivity upstream from Akt
   - p-Akt increases by 75% in HUVECs treated with PHEX.
   - p-Akt increases by 75% in HUVECs treated with PHEX.

4. ProgX bioactivity
   - Fru-A, B, and C all induced p-Akt – strongest response from B (progeny fraction).

5. Conclusion and further work
   - Polyphenols, in a polyphenol-rich pomegranate extract, activates the NO-producing enzyme NOS in HUVECs.
   - One mechanism that could explain this activity is the inhibition of protein phosphatase (PPI).
Chemical composition of essential oil of some local Bulgarian culinary spices

Alexieva I., Stoyanova A., Mertchjanov P., Sapundzhieva T., Popova A., Baevs M.
University of Food Technologies - BULGARIA

Introduction
Chemical composition of essential oil of Bulgarian local culinary spices "levurd" (Allium ursinum L.), "samandali" (Allium bulbocodium), "baroche" (Cuminum), Chrysanthemum balsamita, "tepavc" (Anethum graveolens L.), is identified.

Materials and methods
Essential oil is obtained through water distillation on British Pharmacopoeia apparatus, modified by Balminov and Balarev, 100 mm. Chemical composition of essential oils is determined by GC/MS analysis - apparatus Agilent 7890A supplied with a mass detector 5973 C, column HP - 5 MS (30 m x 0.25 mm, film 0.25 μm), temperature conditions: 50 °C for 3 min, then 8 °C/min to 240 °C for 3 min, total 45 min (for Chrysanthemum balsamita: 40 °C/0.3 min, 5 °C/min to 300 °C for 5 min, total 65 min), carrier helium gas flow 1.0 ml/min, split ratio 6:1 (Allium bulbocodium and Chrysanthemum balsamita), 10:1 (Allium ursinum), 5:1 (Anethum graveolens).

Results
Essential oil of Allium bulbocodium is characterized with 14 identified components (40.83 % of the total composition), 4 of which are above 1% - ethyl benzene - 1.29%, thioctic acid - 1.14%, benzaldehyde - 1.13%, 3,4-Diisopropyl-1,2,4-trithiane-1.12%, and 11 are below 1%. In Allium ursinum L. essential oil 13 components have been identified, 6 of which - below 1%. The surface components predominate (60.70%), diallyl disulfide - 8.81%, methyl α-propenyl disulfide - 6.65%, diallyl trisulfide - 6.73%, methyl α-propenyl trisulfide - 6.83%, dimethyl trisulfide - 1.56%, methyl 1-propenyl disulfide - 1.13%, diallyl disulfide - 1.19%, dimethyl disulfide - 0.86%, α-1-propenyl trisulfide - 0.56%, δ-2-propenyl trisulfide - 0.86%, dimethyl tetrasulfide - 0.96%.

In the Anethum graveolens essential oil 20 components have been identified (61.27% of the total composition), 9 of which are above 1% and 11 are below 1%. The terpenes are predominant. The highest in the composition are p-Limonene - 23.74%, carvone - 34.87%, p-cymene 8.79%, trans-Dihydrocineone - 7.42%, heaxahydrofarnesyl acetone - 6.40%, 3,6-Dimethyl-2,3,4,4,8,8-hexamethyltricyclooctene - 4.04%. The richest in identified compounds is the essential oil of Chrysanthemum balsamita - 41 components, 15 of which are above 1%. Considerable is the amount of carvone - 47.81%, followed by α-thujone - 13.36%, β-germacrene-D - 6.23%, benzaldehyde - 3.98%, δ-germacrene-3,13%, δ-limonene - 2.54%, α-cadinol - 2.31%, β-bisabolene - 1.73%, trans-p-Menth-2,8-dieno - 1.73%, m-Xylene - 1.72%, Apic - 1.57%, Farnesol - 1.45%, α-muurolol - 1.33%, eucalyptol - 1.31%.

Conclusions
The identification of A. ursinum, A. bulbocodium, A. graveolens, C. balsamita essential oil chemical composition contributes to better understanding of the functional properties and beneficial effect on health of the studied local spices and their application in culinary products or natural medicine purposes.
FOOD SENSORY CHARACTERISTICS OF TRADITIONAL BULGARIAN FERMENTED BEVERAGES BASED ON WILD FRUITS

* Dept. of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria
* Dept. of Statistics and Informatics, University of Food Technologies, Plovdiv, Bulgaria

Introduction

The study aims development of sensory profiles of a fermented lingonberry beverage “lvuto”, made by traditional [L1] and modified technology [L2] – with 8% sugar in the media and [L3] with 8% sugar and yeast) to enhance the fermentation process and better preserve biologically active components.

Materials and Methods

The research investigated the perceived difference between the new varieties of “lvuto” and the traditional beverage through quantitative sensory descriptive profiles of the three lingonberry fermented beverage samples. Juices are evaluated by a group of trained food beverage sensory experts. Each panelist tested the product and gave “descriptors”, that are put together, and screened to develop a precise lexicon, ensuring that all of the panelists will make the observations in a uniform manner. A vocabulary that describes the specific characteristics of traditional beverage “lvuto” made by 5 informants from Veligorad and Dospet, where the beverage is still traditionally produced, is considered also. The coded samples are presented, in a different order for each trained panelist. The level of differentiation of L2 and L3 from the traditional beverage is evaluated on the basis of appearance, taste, flavour, and colour profiles. Hunter L,a,b and CIE Lab a,b, Color characteristics are defined by the method of Gardner on colorimeter Colorgard 2000, BYK – Gardner Inc. (L = intensity; brightness; L = 0 – black; L = 100 – white; *a* = red, *a* = green; *b* = yellow, *b* = blue). Hedonic scale is used to evaluate the rate of acceptance of the three samples by randomly chosen 68 respondents at a supermarket in Plovdiv on the principle of volunteering. Multiple comparison test by the method of Schéffe is run. Statistic analysis of data is performed, using ANOVA.

Results

The respondents are rather indifferent to traditional “lvuto” beverage (average level of acceptance (AVA) = 5.6), probably due to the fact that few of the respondents are acquainted with the beverage (only 9% have tried it before). Sample [L2], being sweeter, is better accepted (AVA = 6.7). Sample [L3] is characterized with high level of disapproval (AVA = 3.9). Linear correlation between sensory and instrumental analysis of colour characteristics (r=0.8910) exists.

Conclusions

There is statistically significant difference perceived by the respondents between Sample [L3] and the traditional “lvuto” (P<0.05) while Sample [L2] and [L1] are difficult to be distinguished.

Acknowledgments

This research is funded by the Junior Researcher by Grant number 01113000145302014 for the European Community’s Seventh Framework Programme (FP7/2007-2013), under grant agreement n. 265919, project: BASEFOOD.
Contents comparison of a natural antioxidant, trans-resveratrol, in a traditional grape-based beverage “hardalıye” and other grape-derived products

Birden Amoutzopoulos*, Gül Birngen Lüker*, Gülnan Samur*, Mustafa Yaman*, Senem Akkus Çevikkalp*
*TÜBİTAK Marmara Research Center, Food Institute, Gebze-Kocaeli, Turkey  Phone: +90 2626773211 Birden.Catinkaya@marm.gov.tr
*Hacettepe University Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Turkey

HARDALİYE
A Fermented Grape Based Traditional Beverage

Consumed in Thrace region in Turkey
Produced by the fermentation of
• raw grapes
• mustard seeds
• dried sour cherry leaves.

trans-Resveratrol
A phenolic compound found in grapes, grape products, wine

In animal and human studies;
• cancer prevention,
• cardioprotective,
• anti-diabetic and
• anti-inflammatory effects of resveratrol have been reported.

It is suggested that;
trans-resveratrol in wine may have an important role to reduce the risk of heart diseases.

Study purpose: to determine trans-resveratrol content of hardalıye samples and compare with the composition of other grape-based beverages reported in scientific literature.

Material & Methods
• Two types of hardalıye were sampled
  ➔ from Kırklareli, Turkey
  ➔ from the production of Autumn
  2011-2012
• Samples mixed to provide 2 composites
• trans-Resveratrol of hardalıye were determined by HPLC with UV detection.
• The trans-resveratrol data of other grape-based beverages were provided from scientific literature which were detected trans-Resveratrol using HPLC methods
• Literature compilation was carried out according to EuroFIR (Network of Excellence, FOOD-CT-2006-513944) quality index guidelines

| Table trans-Resveratrol contents of different types of grape derived beverages and hardalıye |
|-----------------------------------------------|-----------|----------------|-----------------|
| trans-Resveratrol (mg/L) | mean ± SD | min-max | acquisition type |
| Hardalıye (n=2) | 1.84 ± 1.21 | 0.98 - 2.69 | O |
| Red wine (n=65) | 5.42 ± 8.7 | 0.06 - 36.13 | P |
| White wine (n=57) | 1.14 ± 1.57 | 0.01 - 7.95 | P |
| Red grape juice (n=8) | 0.57 ± 0.36 | 0.09 - 1.09 | P |
| White grape juice (n=20) | 0.06 ± 0.04 | 0.03 - 0.19 | P |
|
O: Own data, in-house; P: Published scientific paper

Results & Conclusions
• trans-Resveratrol content of hardalıye was similar with wines and red grape juices.
• Hardalıye may be considered as an alternative dietary source to wine for achieving the beneficial health effect of resveratrol.
• Hardalıye does not contain alcohol. Therefore it can also be consumed by particular populations safely (such as; children/ patients/ chronic disease patients)
• Further investigations could direct;
  • to determine the trans-resveratrol contents of hardalıye,
  • to include the contents of such phenolic compounds of particular traditional foods in food composition databases.

References

Funding acknowledgment: The study has been funded under Traiya Development Agency 2011, Financial/ Technical Support Programme.
AMPELOGRAPHIC AND CHEMICAL CHARACTERIZATION OF LOCAL GRAPES FOR ‘SABA’ AND ‘AGRESTO’ IN REGGIO EMILIA AND MODENA (NORTHERN ITALY)

Cristina Brigatti1,3, Andrea Antonelli1,3, Serena Iacarco1,3, Francesca Masino1,3, Valeria Mattioli1,3, Giuseppe Montevercini1,3, Giuseppe Vasile Simone1,3
1 Department of Life Sciences, University of Modena and Reggio Emilia 2 Reggio.Silosa, University of Modena and Reggio Emilia 3 muad cristina.brigatti@unimore.it

Introduction
‘Saba’ and ‘Agresto’ are traditional Italian products both based on unfermented grape juices, that are concentrated by heating. Anyway, they have opposite taste, functions, and history. Grapes are, in fact, harvested at different stages of maturation: green for ‘Agresto’, which is extremely sour and represents the ancient alternative to vinegar, and red or purple for ‘saba’, which is extremely sweet and it is used as a sweetener provided with pleasant caramelization flavors in drinks, to garnish sweets, and to season meat and cheese dishes. In Emilia Romagna, both have been produced for centuries, but currently ‘saba’ is still cooked at home and manufactured in small firms, whereas the memory of ‘Agresto’ has been locally almost lost and the attempts to resume it have just begun.

Within the framework of the Italian AGER project “An Italian Vitis database with multidisciplinary approach for exploitation and valorization of the regional genotypes”, a survey on grapevine cultivars ( cvs) used for ‘saba’ and ‘agresto’ is in progress.

Material and methods
Knowledge on raw material and uses has been documented by references and interviews to farmers and manufacturers. Grapes of the cvs used have been sampled in the collection of I.T.L. Zanelli, Reggio Emilia, Italy) and characterized by means of ampelographic descriptors, physico-chemical parameters (Brix, pH, and titratable acidity), total anthocyanin and flavonoid content and main anthocyanin percentage content of red cvs.

The grape varieties of saba
Almost all the ancient autochthonous cvs widely cultivated in the area or with minor diffusion were used for nothing ‘saba’. Currently, the local availability plays a major role in the varieties used. The white grapes Teobaldo di Spagna and Trebbiano modenesi, besides the red Lambrusco (L.) salamino and L. di Sorbara are generally preferred in Modena, whereas the red cvs Ancellotta, L. grapparossa, L. salamino prevail in Reggio Emilia. Some firms characterize their production with peculiar minor cvs (e.g. Spergola, in Reggio Emilia, Fortuna, in Modena).

The grape varieties of agresto
Just a little information is available. The ancient use of cvs Lugliana (’Lugda’) and Uva Tosca has been documented. It is likely that also other varieties were used.

<table>
<thead>
<tr>
<th>CULTIVAR</th>
<th>OIV 204</th>
<th>OIV 208</th>
<th>OIV 223</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancellotta</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Fortuna</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Lambrusco di Sorbara</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Lambrusco grapparossa</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Lambrusco salamino</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Lugliana</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Spergola</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Uva Tosca</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Teobaldo di Spagna (1)</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Teobaldo di Spagna (2)</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Teobaldo modenesi</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Degrees Brix, flavonoid and anthocyanin contents, and level of titratable acidity differ among cultivars and may affect the final quality of ‘saba’. Acidity can give a pleasant taste to the saba. The traditional long heating of must gives a dark color, whatever the cultivar, whereas varieties differences could be maintained with lower temperature and shorter industrial processes. The anthocyanin profiles allows a partial discrimination among the red cvs. Ancellotta shows high relative content of delpinidine and petunidin derivatives; Uva Tosca differs from the other cvs for a high relative content of secondary malvidin derivatives, such as the acetyl-glucoside and cyanosyl-glucoside. Among the Lambrusci, L. salamino has a high relative content of petunidin derivatives, and low of peonidin-ones.

Conclusions – The tradition of ‘saba’ is well preserved in the areas of Modena and Reggio Emilia and the effects of morphological and chemical differences among cultivars on sensory quality of the products deserves a more deep analysis. ‘Agresto’ is currently an almost forgotten traditional product, for the recovery of which a more detailed investigation on raw material and processing systems seem appropriate.
Sensory evaluation of edible flowers of wild *Allium* species used as food in local traditions in Italy

L. Filippo D’Antuono, Manuela A. Manco – Department of Agri-Food science and technology, Cesena, University of Bologna, Italy

**BACKGROUND**

The use of edible flowers is reported since long times in several culinary traditions. The use of some flowers is very popular; in Italy, the most widely employed are crocus and lily flowers, used as ingredients in a number of dishes, whereas various and other tree flowers are the more widely used types used in popular traditions. Some restaurants make use of a wider range of flowers, but often only with mainly ornamental purposes.

Besides this, however, several flowers can add particular tastes to dishes. The leaves and buds of some wild *Allium* species are used in popular food traditions in Italy. This contribution aimed at examining the acceptance of their flower taste and appearance, and possibilities of use.

**Materials and methods**

Three wild Mediterranean *Allium* species were considered in this investigation:

- *Allium neapolitanum* Cirillo has wide, compounded flowers, with white tepals; flowers are in loose medium-size umbrellas
- *Allium rosanum* L. has compound petalled flowers, with generally pink tepals; flowers are in loose small umbrellas, often bulbil-bearing
- *Allium triquetrum* L., has white long bell-shaped flowers, with white, green striped tepals; flowers are in unisexual umbrellas

The flowers were harvested at full bloom:

1. in the Liguria region: *A. triquetrum* and *A. neapolitanum*
2. in the Emilia-Romagna region: *A. rosanum*

Cleaned, and refrigerated to 4°C until sensory analysis.

**Sensory analysis**

- In the facilities of the Food Science Campus, Cesena
- 29 panelists, trained to evaluate plant based foods, responded on:
  1. Attitude towards the use of edible flowers
  2. Flower acceptance ratings: visual, olfactory and taste (1-9 scale)
  3. Definition of perceived specific sensory notes (focus group) and perception of specific notes, binary scale, free choice
  4. Opinion about the more suitable foods for *Allium* flowers

**Results**

1. **Panellists attitude towards the use of edible flowers**

   - If you know the culinary use of flowers?
   - Your opinion about the culinary use of edible flowers?
   - Are you willing to try dishes with edible flowers?

Panelists were well aware and with positive attitude towards the use of edible flowers.

2. **Flower acceptance ratings**

   - *A. rosanum* obtained the overall best ratings.
   - *A. triquetrum* was visually less appreciated whereas *A. neapolitanum* had the lowest taste ratings.

3. **Perception of specific sensory notes**

   - *A. neapolitanum* was characterized by a lower perception of specific notes. The difference of response distribution among species was mainly due to different frequencies of sweet, garlic, spicy, and legume notes in *A. neapolitanum* with respect to *A. rosanum* and *A. triquetrum*.

4. **Opinion about suitable foods for *Allium* flowers**

   - *Allium flowers* were evaluated to be more suitable for dishes where their appearance is still visible.

**Conclusions**

As a whole, the flowers of the species considered obtained high visual and sensory acceptance ratings. The panelists expressed a high appreciation for the unexpected strong taste of flowers, although it may be coupled with typical sweet notes. A more widespread use should mainly depend on the acquiring of a consumption habit and on the supply, that is presently limited to wild sources, with strong seasonality, restricting availability to few days a year.

**Acknowledgements**

This research has received funding from the European Community’s Seventh Framework Program (FP7/2007-2013) under grant agreement n. 227518, project ‘InSeFood’.
Comparison of leafy kale populations for their bioactive compound content: phenolics, glucosinolates, carotenoids, and chlorophylls


University of Bologna, Cesena, Italy
Instituto Nacional de Saúde Doutor Ricardo Jorge, Lisboa, Portugal
Yeditepe University, Istanbul, Turkey

e-mail: federico.feroli@unibo.it

Introduction

Kales represent leafy forms and primitive types of Brassica oleracea L. Different forms of kale are traditional crops of several European countries (Italy, Netherlands, Portugal, Scotland, Spain, Turkey). They are rootstock in local farming and food systems, and largely employed in the preparation of traditional dishes such as soups, filling of pastries, or simply as side. Owing to similar aspects in their utilisation in the local systems of Italy, Portugal, and Turkey, kales appear a proper subject for a cross-country comparison. Furthermore, kales have recently gained increased attention due to their high content of potential health promoting phytochemicals such as carotenoids, glucosinolates (Gls), and phenolics. The present investigation is aimed to compare different kale populations, either from local sources or cultivated in a common environment, for their bioactive amounts.

Materials and methods

25 kale samples (9 from Italy, 9 from Portugal, and 7 from Turkey) were sampled from local crops or markets (winter 2010). For the experimental trial, 15 kale seed samples (7 from Italy, 6 from Turkey, and 2 from Portugal) were obtained from local seed companies or farmers. Seeds were planted in nursery (August 2010), and the plants were transplanted to a field located in Materano (Cosenza, Italy) September 2010. Leaves were freeze-dried before bioactive extraction. Gls and phenolics were extracted by a mixture methanol-water. GLs underwent enzymatic demethylazation, and were purified from pectinates by solid phase extraction. Pigments were isolated by iterated hydrolysis (IHF). Bioactive were quantified by high performance liquid chromatography (HPLC). GLs and phenolics were identified by a system (HPLC×mass spectrometry (MS)) whereas pigments by standard compounds.

Legend to figures. J, P, and T stand for Italian, Portuguese, and Turkish samples, respectively. L and E stand for local and experimental samples, respectively. Numbers in sample abbreviations identify kale type.

Results and discussion

Phenolics

• 52 phenolic compounds were identified; 43 were flavonol glycosides of quercetin, luteolin, and isorhamnetin, 9 were derivatives of hydroxychalconic acids.
• Interesting variability was noted in phenolic levels, especially within local populations.
• On average, Portuguese kales were 97 and 58% higher in phenolics in comparison to Italian and Turkish samples, respectively. Phenolics were hardly affected by the growing conditions.
• In all samples, flavonoids represented more than 80% of total identified phenolic compounds.

Gls

• A high variability of Gls content was assessed within local samples, especially in Italian kales.
• Locally cultivated Italian, Portuguese, and Turkish kales showed total Gls amounts 82, 140, and 125% higher than those determined in the corresponding experimental samples.
• Aliphatic Gls fraction was high in Portuguese kales, where it ranged from 0.3 to 0.9 mg/g, and from 0.3 to 0.2 mg/g in local and experimental samples, respectively. In Italian and Turkish samples aliphatic Gls accounted on average for more than 80% of total Gls.
• Sinigrin (SIN) and glucobrassicin (GB) were the most abundant amongst individual Gls. SIN was not detected in Italian and Turkish samples, but accounted on average for 36% of total Gls in Portuguese samples. GB constituted on average 54, 36, and 84% of total Gls in Italian, Portuguese, and Turkish populations, respectively.

Carotenoids and chlorophylls

• Identified pigments were beta-carotene, chlorophylls a and b.
• Pigments were significantly more abundant in experimental samples in comparison to local kales, owing to the higher soil fertility level. The highest pigment contents were assessed in the dark leafed Italian populations.

Concluding remarks

• Geographical origins and growing environment appeared as significant factors in determining bioactive levels in leafy kales and their nutritional and sensorial attributes of plants.
• A consistent range of variation was detected for bioactive, especially within local populations. This variability does not allow the idea of a selection of a “best” kale type, since the preparation of traditional foods remains in any case linked to the use of local populations.

Research funded under FP7 EU project BaseFood, grant agreement n. 227118.
Characterization and quantification of bioactive compounds in primitive wheat populations

Elia Giambonelli, L. Filipe D’Antonio, M. Agata Mace, Osman Hayran, Mike Kocasjlo, Iordanis Alexiou, and Nana Darbinyan

University of Bologna, Food Science University Campus, Casale, Italy

COT University of Istanbul, Istanbul, Turkey

University of Food Technology, Plovdiv, Bulgaria

ECOCASIO, Yerevan, Armenia

Introduction

The term “primitive wheats” refers to ancient forms of cultivated wheat species (genus Triticum) that have been replaced, in modern agriculture, by varieties obtained by breeding. Their production survived in several areas of Western Europe where there is considerable interest in the consumption of ancient wheats, above all in organic, specialty, and health food markets. The main species that have been considered during the present work were two hulled wheats, retaining the glumes after threshing: sinkorn (Triticum monococcum L) and emmer (Triticum turgidum subsp. dicoccum (Schrank ex Schübler) Thell), together with some other hulled and free-threshing primitive wheat types.

Materials and Methods

27 accessions from Armenia, Bulgaria, Georgia, Italy and Turkey, together with 4 commercial durum and bread wheat varieties used as controls, were considered. The analytical samples were obtained from a field experiment conducted in Bologna, under homogeneous environmental conditions, during the spring and summer growing periods (December 2010 and March 2011, respectively), to discriminate between winter and spring habit populations. Harvest, at grain full ripening stage, took place in July 2011 and the product was cleaned and preserved in adequate conditions. Grain yield and dry matter content were preliminarily calculated. Lipids were extracted by a chloroform/methanol mixture and on this fraction were analyzed tocoids, carotenoids and sterols. Determination of tocols and carotenoids was carried out using a normal phase HPLC method. The sterol fractions were analyzed by GC after silylation, using a Flame Ionization and a Mass Spectrometry mass detector. Phenolic compounds were extracted into free and bound phenolics. The quantification was accomplished by HPLC and a coupled system HPLC-mass spectrometry was adopted for identification.

Results

The lipid content was between 1.80 and 2.85%, slightly higher for the spring sowing, especially for the commercial and the T. monococcum types (Figure 1).

The carotenoids content was very different between the species, as represented in Figure 2. T. monococcum and T. durum showed the highest levels of carotenoids (5.48 mg/kg d.m. for W1, 5.75 and 8.00 mg/kg d.m. for CO2 and CO4, full sowing); in the case of T. dicoccum the sum ranged from 1.63 to 4.90 mg/kg d.m. Five compounds have been detected: the sum of α- and β-carotene, β-cryptoxanthin, two isomeric forms of lutein and zeaxanthin. Lutein resulted the most abundant in all the samples (73-78%), reaching the highest amounts in T. monococcum, T. turgidum, and T. aestivum.

Four different positional isomers of tocoids were identified: α- and β-tocopherol, and α- and β-tocotrienol, with the last one as the predominant compound. Total tocoid content ranged between 26.6-72.8 mg/kg d.m. (Figure 3).

Higher values were obtained in the case of the spring sowing, especially for the samples from Georgia, like W3, W4 and W6. Several sterols have been identified. Their sum was even higher than 500 mg/kg d.m., except for one commercial type of T. aestivum (Figure 4). From the second date of sowing we obtained samples richer in sterols, especially the Turkish species and the controls of T. dicoccum. In all the primitive wheats, β- sitosterol was the main compound, followed by campesterol. Plausible resins, the most representative flavonoid group in the free phenolic fraction (FPF), this class was present as glycosidic forms of apigenin and the sum was around 200-300 mg of rutin/kg d.m. The fraction of bound phenolic compounds (BFC) was mainly composed of phenolic acids, with ferulic acid as the predominant, accounting for 80-85% of the total; a lower percentage was observed for all the Turkish samples and for T6 (60-70%), where we had a greater amount of p-coumaric acid (around 20%). Bound phenolic fraction contributed to the total phenolic content more than 60%, ranging from 628 mg to 1223 mg of ferulic acid/kg d.m (Figure 5).

Conclusions

The present research represents a further contribution to the available literature of the analytical composition of primitive wheats, including, for the first time, the complete range of relevant bioactive. Some lesser investigated species, like GeorgIan T. spelta, T. turgidum, and T. aestivum, have been included as well. T. monococcum and T. durum had the highest level of carotenoids, while T. dicoccum showed the lowest (tetracosanol/tocopherol ratio) (c)2. The ratio between bound and free phenolic compounds (BFC/FPF) resulted characteristic for the species examined; it was greater than b for T. monococcum, and assumed values around 2 when considered T. dicoccum varieties.
**Introduction**

Health awareness raises attention to products rich in carotenoids, due to their role both as pro-vitamins and antioxidants. Pumpkin is a basic ingredient of a variety of traditional Bulgarian foods – salads; soups; stews; jams; marmalades; “tikvenik” (layers of pastry, stuffed with pumpkin); tahani; purées, mashies; and juices. The fruit is boiled, fried, stewed or boiled. This paper aims at sharing the knowledge and experience of traditional ways of utilization of pumpkin in the Bulgarian diet, thus enriching the existing European practices and healthy diet options.

**Materials and methods**

Carotenoids are separated on a C-30 reversed-phase column and are characterised by HPLC-DAD by the method of Kurts et al. (2008), modified by Obreshkov et al. (2011). Total carotenoids are determined according to the method described by Dini et al. (2010) and the half-life values are calculated as proposed by Herbusch et al. (2005). Neutral monosaccharides of the hydrolysed alcohol-insoluble residue and water-extractable monosaccharides are analyzed using high-performance anion-exchange chromatography with pulsed amperometric detection (HPAEC-PAD). The IFU method is followed for the total pectin content determination using methanol instead of carbazole and the results are expressed as alginogalacturonans equivalents. Helios Omega UV-Vis spectrophotometer, equipped with VISION® software and ColorCalc® Basic software (Thermo Fisher Scientific, Madison, WI, USA), using 1 cm path length cuvettes is used. For the colour analysis, visible spectra from 380 to 780 nm are recorded in a transmission mode. Bioactive and nutritional components of pumpkin (Cucurbita moschata Duch., cv. Muskatan 51-17) and the effect of heating on them are studied.

**Results**

Seven carotenoids and carotenoid esters are identified: lutein (5.97%); 13-cis-β-carotene (1.37%); α-carotene (24.48%); all-trans-β-carotene (33.01%); β-cryptoxanthin (2.71%); lutein-dilaurate (15.39%); lutein-laurate-myristate (11.15%). The total β-carotene content in the pumpkin is 227.22 μg/100g. Trans-β-carotene is 296.11 μg/100g, while 13-cis-β-carotene is 24.59 μg/100g. Heating resulted in a reduction of the total carotenoids in particular significantly after 2h of treatment. Stability of total carotenoids is evaluated through their half-degradation time (4.7 h, R²=0.96). Linear correlation is observed between color characteristics and total carotenoid content (R²=0.9987; R²=0.9712). The total pectin content is determined. Baseline separation of five monosaccharides, including xylose and mannose, is achieved. Glucose accounts for approximately 89% of the total content of individual monosaccharides, followed by galactose (10%) and arabinose (5%).

**Conclusions**

The study on biologically active components of the most used variety of pumpkin, a component of many Bulgarian traditional foods, will help in better preserving them.

**Acknowledgements**

The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227118, project BioSeFed.
ANALYTICAL CHARACTERISATION OF OILSEED RAW MATERIALS USED IN PRODUCTION OF TAHIN AND HALVA

Federica Pasini *, M. Fiorenz Caboni *, Iordanka Alexieva *, L. Filippo D’Antuono *

*University of Athens, Greece (Athens, Greece); **University of Food Technologies, Plovdiv, Bulgaria;
* federica.pasini@unibo.it

INTRODUCTION. Tahin is one of the oldest traditional desserts in the Middle East and the Black Sea Area. In the oilseed variant, it is usually made mixing sugar with sesame paste (tahin). Virtually any oilseeds or oily nuts are adequate to manufacture tahin, and sunflower is mostly used in several countries. Within BaseFood project some oilseeds are used in the production of halva were sampled and analytically characterised with respect to their bioactive compound content and oxidative quality.

MATERIALS & METHODS. The experimental raw materials used in production of tahin and halva, supplied by UFT (Bulgaria), were represented by seven different oilseeds, namely: almonds, sunflower, hazelnuts, sesame seeds, sunflower seeds, pumpkin seeds and peanuts. Samples were characterised for their lipid and phenolic compounds. Fatty acids (FA) and sterols (S) were analysed by FID-GC after fat extraction and according to Christopherson & Glass [1] and Sanders et al. [2], respectively.

RESULTS. Lipid compounds. All oilseeds and nuts were characterised by a predominance of polyunsaturated fatty acids (PUFA) and a polyunsaturated fatty acids (PUFA) over saturated fatty acids (SFA) ratio (Fig. 1). Oleic (C18:1) and linoleic acids (C18:2) were the predominant contributors toward the make-up of the total fatty acids in the seeds. Besides, the UFA/SFA ratio was evaluated and all seeds showed values higher than 2, that is the right ratio for a correct diet, as suggested by LARN.

The content of total free fatty acids ranged from 147.8 to 369.8 mg/100 g of fat and the order of decreasing total acid content was: pumpkin seeds > sesame seeds > sunflower seeds > sunflower seeds > peanut (decreasing order). As reported in Fig. 2, phytosterols was the most abundant sterol in all samples, ranging from 96.7 to 85.8% of the total sterol content of sunflower seeds and peanuts presented the highest relative contents in campesteryl (19.0, 11.9 and 15.4%) and stigmasterol (6.1, 9.2 and 6.6%). Phytosterols eluted very close together; whereas campestanol and β-sitosterol, present in low amounts in all oilseeds.

Phenolic compounds. Sunflower seeds showed the highest phenolic content with a total of 216.8 mg/100g of product, followed by sunflower seeds (98.7 mg/100g). The other seeds had lower contents, ranging from 229 mg/100g in peanuts to 32.8 mg/100g in almonds. As reported in Fig. 3, the relative contents of the three phenolic groups estimated in all the seven samples. Peanuts and sunflower seeds showed the highest relative amount in H (31.2% and 42%), whereas almonds the maximum value of F1 (23.4%). All seeds presented a higher percentage for the P group as well. In peanut (at both 280 nm) all the extracts with an aromatic ring have a maximum of absorbance, so with this index are collected all the other phenolic compounds.

Antioxidant capacity. From the phenolic extracts of seeds, their antioxidant activities by the ABTS® assay were also evaluated and results were expressed as Trolox Equivalent Antioxidant Capacity (TEAC). As shown in Fig. 4, walnuts reported the highest value (14.5 mmol Trolox/100g of sample), followed by sunflower seeds and peanuts. These seeds are also the same samples with the highest phenolic content.

Oxidative status. The peroxide value (PV) was used to establish the primary oxidation status of seeds. Fig. 5 reports the peroxide contents in samples and pumpkin seeds showed the highest PV (23.7 mg of O₂·kg of fat), with a value above the legal limit for food lipids (20 mg of O₂·kg of fat). Almonds and sunflower seeds had very high values, whereas hazelnuts showed the lowest amount (4.2 mg of O₂·kg of fat). In order to confirm the extent of oxidative deterioration, secondary oxidation products were also evaluated and conjugated diene (K232) and triene (K288) were measured. K232 confirmed the UV band (Fig. 5), with the highest value (7.5) for pumpkin seeds, and peanuts and hazelnuts with the lowest ones (1.3 and 1.7). K288 (Fig. 5) also confirmed the oxidative status of the pumpkin seeds, whereas the other samples did not show significant differences, ranging from 0.13 of peanuts to 0.21 of hazelnuts.

CONCLUSIONS. For the oilseed samples analysed in this study, no intra-specific variation was explored. However, this work gave a first contribution to the characterisation of the materials considered, that is a pre-requisite for determination of the evolution of these substances during food preparation and processing. Besides, these results allow to stress the importance of monitoring the oxidative status of raw materials to be used for further processing.

REFERENCES.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227714, project BaseFood.
Identification of phenolic and glucosinolate bioactives in kare, dill, annual nettle (Urtica urens), Sideritis scardica, persimmon and pomegranate from the Black Sea region using LC-DAD-MS.

Saha G1, Woodcock ME1, Konik-Ristic A2, Gilibetic M3, Boyko N1, Jorgadze M4, Hayran O5 and Kroon PA6
1 Institute of Food Research, Norwich Research Park, Norwich NR4 7UA, UK; 2 Institute of Medical Research, Belgrade, Serbia; 3 Uzhhorod National University, Uzhhorod, Ukraine; 4 Biological Farming Association (ELEKANA), Tolissi, Georgia; 5 YEDITEPE University, Istanbul, Turkey.

INTRODUCTION

Epidemiological-study support that phenolic compounds and glucosinolates in plant food products could be related to a decrease in the mortality of cardiovascular diseases and certain types of cancer. Bioactive-rich plant materials [1-6].

Brassica oleracea acephala (kale) 
Andrographis paniculata (dill) 
Urtica urens (annual nettle) 
Sideritis scardica (mountain tea) 
Diospyros (Persimmon) 
Punica granatum (pomegranate)

were sourced from defined locations of the Black Sea Region and used as traditional food products in this region.

The aim of this study was to identify the naturally occurring phenolic compounds and glucosinolates in these plants extracts. In the present study, a methodology was based on liquid chromatography with diode array detection coupled to electrospray ionization mass spectrometry.

METHODS

The bio-active plant materials were extracted by the following way:

The glucosinolates were extracted and analysed by published methods [7].

LC-DAD-MS conditions: Samples and standards were analysed for phenolic compounds on an Agilent 1100 HPLC-DAD-MSD system, using a Luna C18 (2) column (Phenomenex) eluted using a gradient mobile phase from 100% A (0.1% formic acid in water) to 100% B (0.1% formic acid in acetonitrile). The identification was carried by tiss. negative ion mode and quantification was carried by external standard calibration curve from 325, 370 and 520 nm data.

Agilent 1100 HPLC-DAD-MS system

Oxidative glucosinolates were analyzed using a Waters Symmetry C18 (250 x 4.6 mm id., 5 μm particle size) column connected to an Agilent 1100 HPLC-DAD-MSD system, using a gradient mobile phase from 100% A (0.1% formic acid in water) to 100% B (0.1% formic acid in acetonitrile). Glucosinolates were monitored using absorbance at 209 nm.

RESULTS

1. Characterization of phenolic compounds by diode array detector

A diode array detector allows recording of UV-vis spectrum of each peak of the chromatogram and shows unambiguous attribution of each chromatographic peak to a certain class of polyphenols, since each class exhibits a characteristic UV-vis spectrum (see Figure 1).

2. Determination of molecular ions using positive and negative polarity mass spectrometry

The identification was carried by the mass fragmentation was supported by the presence of adducts generated by the solvent/sodium and by molecular complexes (see Figure 2).

Figure 2: Mass spectra of caffeoylquinic acid, A-positive polarity, B-negative polarity.

3. Identified phenolic and glucosinolates in six plant materials from the Black Sea Region

Table 1. Identified phenolic and glucosinolates in kare, dill, nettle, Sideritis scardica, persimmon and pomegranate

CONCLUSIONS

HPLC-DAD-MS techniques were successfully used for the identification of both known and previously unknown phenolic acids, flavones, flavonois, flavon-3-ols, anthocyanidins, and glucosinolates in extracts of plants typical of the Black Sea Region.

REFERENCES


Acknowledgements

This research was funded by EU FP7 project number 227719 (BioFood) and the BBSRC.
Antibacterial Activity of Some Local Bulgarian Culinary Spices

Sapundjieva T., Alekseva T., Boyko N., Stryanova A., Merzbchanov P.

*Department of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria
*Department of Technology of Tobacco, Sugar, Vegetable and Essential Oil, University of Food Technologies, Plovdiv, Bulgaria

Introduction. Two local wild herbs, grown in Bulgaria - "levurdia", ramsons (Allium ursinum L.) and "samardala" (Nectaroscordum siculum Lindl. Nectaroscordum siculum ssp. bulgaricum (Janka) Steam; syn. Allium bulgaricum), have been studied for their antibacterial activity against two Gram (+), and two Gran (-) pathogenic bacteria.

Materials and methods. "Levurdia", known as wild garlic or bear's garlic, has been collected from the area of Northern Rodopa mountain. "Samardala" is growing along the Black Sea coast (the region of Varna, Strandja), eastern part of Sterdna Gora and in Central and Eastern Stara Planina. Antibacterial activity of Allium ursinum and Allium bulgaricum is studied against Listeria monocytogenes NCTC 11994, Staphylococcus aureus ATCC 25923, Escherichia coli ATCC 8739, and Salmonella enterica subsp. Enterica serovar Abony NCTC 6017. The media are prepared according to the standards, inoculated with 24-hour suspension of the corresponding bacteria (concentration over 10^6 CFU/ml). A modified method of Tagg and McGivern is applied to measure the zone of the pathogen’s growth inhibition around the spots of tissue liquids, obtained from fresh leaves of the spices. GC-MS analysis is used for determination of the chemical composition of spices’ distillates.

Results. Both of spices showed inhibition activity against the tested pathogenic bacteria. The inhibition zones [mm], produced by 0.12 ml tissue liquid of levurdia against the respective pathogens were 38/36/14/14 in diameter, whilst inhibition zone of samardala were 38/20/10/12 in diameter. The stronger inhibitor was levurdia. In the volatile oil composition of levurdia there were identified 14 compounds (40.89 % from the content). Eight of them were presented in a concentration of over 1 %, the others – in a concentration under 1 %. The basic components (over 3%) were as follow: diallyl disulphide (8.31 %), methyl 2-propenyl disulphide (6.83 %), diallyl trisulphide (6.73 %), and methyl 2-propenyl trisulphide (6.63 %). A prevalence of sulfur-containing compounds (97.3 %) is obvious. In the oils of samardala there were identified 14 compounds (8.98 % from the content), from which four in a concentration of over 1 %, and the other ten – under 1 %.

Conclusions. Both spices showed inhibition activity against the studied pathogens. The stronger inhibitor was levurdia. We suppose the reason is the prevalence of sulfur-containing compounds in its volatile oil composition. These spices could be used in the food industry as natural preservatives.
The use of biometrical traits and molecular markers in the characterization of a traditional onion landrace (Cipolle di Giarratana)

Laura Siracusa, Ezio Riggio, Giovanni Avola, and Giuseppe Ruberto

Istituto del CNR, di Chimica Biologica, Via P. Garibaldi, 18, 95126 Catania, Italy

Introduction
Onion (Allium cepa), has been used as a common food since ancient times. Onion bulbs are rich in several phytochemicals recognized as important elements of the Mediterranean diet, such as flavonoids, vitamins, and minerals, and they have also been reported to have numerous medicinal and functional properties. The majority of these effects have been associated with the presence of particular molecules belonging both to its primary and secondary metabolites. Among them, flavonoids, especially quercetin, are considered the most relevant antioxidant secondary metabolites present in onion bulbs, with quercetin-3-O-β-D-glucuronide and its derivatives being highly consumed. onion bulbs have been demonstrated to be highly variable in terms of their content in polyphenols and flavonoids, this phenomenon is also reflected in the production of different types of flavonoids. In the present study, the use of molecular markers was used to identify the presence of specific flavonoids in onion bulbs and to evaluate their potential use as a tool for the identification of the geographical origin of the bulbs. The results showed that the onion bulbs studied were characterized by a high content of flavonoids, and the presence of specific flavonoids was associated with the geographical origin of the bulbs. This information can be useful for the identification of the geographical origin of the onion bulbs and for the development of new varieties with specific flavonoid profiles.
Investigations of Polycyclic Aromatic Hydrogencarbonate levels in traditional smoked fish and meat

Vita Sterna, Janis Miculis, Anda Valdovska, Janis Zuits and Artis Ernsts
Liauni University of Agriculture, Research Institute of Biotechnology and Veterinary Medicine „Sigra”,
Faculty of veterinary medicine, Latvia University of Agriculture Meat and Milk Industry of Agriculture

OBJECTIVES
Smoking is one of the oldest technologies for the conservation of meat and fish products. Today it is supposed that this technology is applied in many forms to treat 40-60% of the total amount of meat products and 15% of fish. Smoke not only gives special taste, color and aroma to food, but also enhances preservation due to the dehydrating, bactericidal and antioxidant properties of smoke. It has been concluded that benzo(a)pyrene is a probable human carcinogen.

The main objective of our investigations was to determine the contents of benzo(a)pyrene, benzo(a)antracene, benzo(b)fluoranthene and crysene in different smoked fish and meat products.

MATERIAL AND METHODS
Fourteen different smoked fish and nine meat products samples were taken and benzo(a)antracene, benzo(a)pyrene, benzo(b)fluoranthene and crysene (PAH4) content in the studied samples were determined. The results obtained in this application were all performed on Waters 2998 Photodiode Array detector. Column ZORBAX Eclipse PAH, 4.6mmx150mm, 3.5μm

RESULTS

Figure 1. Average benzo(a)pyrene and average PAH4 content in industrial smoked fish products, μgkg⁻¹

Figure 2. Average benzo(a)pyrene and average PAH4 content in industrial smoked meat products, μgkg⁻¹

CONCLUSIONS
Smoke not only gives special taste, color, and aroma to food, but also enhances preservation due to the dehydrating, bactericidal and antioxidant properties of smoke. This study clearly demonstrates that the production of smoked fish and meat products with BaP levels less than maximum acceptable possible in non-intensively smoked products.

The authors gratefully acknowledge the partial financial support provided by the Latvia Council of Science project No.09-119: Polycyclic aromatic hydrocarbons markers, benzo(a)pyrene, benzo(a)antracene, benzo(b)fluoranthene and chrysene, forming influencing factors by using traditional meat and fishes smoking methods in Latvia International Traditional Food Congress, October 4-5, 2012, Cesena, Italy. E-mail for contact: viesta@lvu.lv
DEVELOPMENT OF NEW TAHINI BASED PRODUCTS, ENRICHED WITH BIOLOGICALLY ACTIVE COMPONENTS FROM LOCAL PLANTS

Alexieva I., Baeva M., Milkova I., Buhalova Dr.  
Dep. of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria

Introduction
Tahini is a traditional product, mainly used in the production of halva. The paper presents preliminary results on new application of traditional tahini, that will give possibility for better utilisation and popularisation of the product for healthier diet. Two groups of products are developed: paste type (spreads) and bakery.

Materials and methods
Sponge sucrose-sweetened cakes (95 g) are prepared following a traditional technology and formulation with peanut and sunflower tahini. Egg yolk is replaced with 15 and 30 % tahini. Tahini pastes are mixed with a mash of fresh local plants samantala (Allium vulgarcum), bear’s garlic (“levurdal”, Allium ursinum L) and jam of rose petals (Rosa Damascena Mill).

Results
The cakes with tahini has less springiness, less tenderness of the crumb, and the structure is stable at high loads most markedly expressed with the sample with 30% peanut tahini (shrinkage: 54.80 ± 8.23%). The cake with 15% peanut tahini has higher water absorption capacity (387.20 ± 1.92%).

Conclusions
Culinary application of the new products are suggested, that can be used to update the food service facilities menus with healthy and interesting products.
EFFECT OF PROCESSING ON SOME BIOLOGICALLY ACTIVE COMPONENTS IN SELECTED BULGARIAN TRADITIONAL FOODS

Alexiava I. *, Mechenov G. b, Milkova I. a

a Dep. of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria
b Scientific Research Center, Plovdiv, Bulgaria

Introduction
The arising health concern and the nutritional and bioactive characteristics of oleaginous nuts and seeds make tahini an interesting product for the wellbeing diet.

Materials and methods
The technological scheme for production of tahini involves cleaning of the seeds, separation of the nut from the husk, roasting, cooling and grinding of the nuts to a tahini mass. On the basis of two factor mathematical analysis the effect of temperature and duration of heating is studied. Samples are heated at 100°C, 120°C, 140°C for 2 hours, taking samples at every 30 min. The total oil content is determined by Soxhlet extraction using diethyl ether for 8 hours. The extracted oils are later on dried and weighted to constant weight. Oil content is counted to dry sample. The oils are analyzed for acid, peroxide values in compliance to ISO standards. Fatty acid composition is investigated by gasliquid capillary chromatography of their methyl esters. The esterification was carried out by Metcalfe and Wang (1981) technique. Methyl esters were purified by thin-layer chromatography on plates, covered with 0.25 mm Silicagel 60 G "Merck" and mobile phase n-hexane:diethyl ether 97:3. Determination is accomplished on a Pay Unicam 304 unit, provided with flame-ionisation detector, 30 mm capillary column "Innowax" impregnation and conditions: column temperature 165°C to 225°C, with a change 4°C/min, detector temperature 300°C, injector temperature 280°C, gas-carrier (N2). Oxidative stability is measured by Rancimat 679 unit at 100 °C and air 20 l/h. Tocopherols are analysed directly in the oil by HPLC with fluorescence detection (15). "Merck-Hitachi" unit fitted with column "Nucleosil" SI 5-3 250x4 mm and fluorescent detector "Merck-Hitachi" F 1000 was used. The operating conditions are as follows: excitation 295nm, emission 330 nm, mobile phase n-hexane : dioxan 94:4, rate of mobile phase 1 cm²/min. The peaks are identified and quantified using authentic individual tocopherols.

Results
Technological parameters of roasting – temperatures and duration of heating effect the sensory and technological properties of the seeds. Significant changes are observed in the taste, colour and friable characteristics.

Conclusions
The study on the changes of the bioactive, and nutritional components contribute for improvement of the process of production of tahini and halva.
Study on Traditional Bulgarian Wild Fruits Fermented Beverages
Alexieva I., Sapundjeva T., Buhalova Dr.
Department of Catering and Tourism,
University of Food Technologies, Plovdiv, Bulgaria

Introduction. "Ljuto" is a traditional Bulgarian beverage, produced of wild fruits (lingonberries) through a process of fermentation. Wild lingonberries (Vaccinium vitis-idaea) are collected in the area of Velingrad. The traditional method of preparation of "ljuto" is recorded in Raktovo and Dospat. It is reproduced at laboratory conditions at UFT. The effect of technological parameters on the biotechnological activity of the beverage is studied.

Materials and methods. Total polyphenols are determined according to the method of Singleton & Rossi with Folin-Ciocalteu’s reagent; anthocyanins - by pH differential method; bioflavonoids and Vit. C - by HPLC on a Merck-Hitachi (Elite La Chrom) instrument equipped with 200 mm x 4.6 mm column Merck Darmstadt, Germany, and Diode Array detector, total sugars - by the method of pihorii. The dynamics of extraction of total sugars, vit. C and biologically active components are followed through the process of production. Microbiological and quality relevant characteristics are also determined. The effect of modification of substrates (Sample 1 - traditional, ratio fruit/water (F/W) 1:3, Sample 2 - 8% sugar, Sample 3 - 8% sugar and yeasts) on the composition of ljuto is studied.

Results. Bioactive components in the raw material (mg/g): phenolic compounds: gallic acid - 35.4, chlorogenic acid - 173.6, vanillic acid - 26.8, caffeic acid -11.4, p-coumaric acid - 5.6, ferulic acid - 7.9, elagic acid - 51.1, 3,4- dihydroxy benzoic acid - 22.1, cinnamic acid - 4.0; bioflavonoid: rutin - 128.6, myricetin - 68.7, quercetin - 97.3, kaempferol - 3.8; anthocyanins - 428.7 mg/kg. The analysis of yeast and Lactic Acid Bacteria populations in the substrates showed a mild mixed lactic acid/alcoholic fermentation.

Table 1. Dynamics of chemical and microbiological characteristics of beverage №1 during fermentation

<table>
<thead>
<tr>
<th>Characteristic, dimension</th>
<th>I week</th>
<th>II week</th>
<th>III week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid, mg dm⁻³</td>
<td>36.66</td>
<td>19.17</td>
<td>9.15</td>
</tr>
<tr>
<td>Total sugars, g dm⁻³</td>
<td>5.7</td>
<td>7.1</td>
<td>3.6</td>
</tr>
<tr>
<td>Acidity, g dm⁻³</td>
<td>1.92</td>
<td>3.83</td>
<td>4.12</td>
</tr>
<tr>
<td>pH</td>
<td>3.0</td>
<td>2.89</td>
<td>2.87</td>
</tr>
<tr>
<td>LABs, lg CFU/cm³</td>
<td>4.49</td>
<td>5.04</td>
<td>5.08</td>
</tr>
<tr>
<td>Yeasts, lg CFU/cm³</td>
<td>5.34</td>
<td>5.69</td>
<td>5.79</td>
</tr>
</tbody>
</table>

Table 2. Dynamics of chemical and microbiological characteristics of beverage №2 during the fermentation

<table>
<thead>
<tr>
<th>Characteristic, dimension</th>
<th>I week</th>
<th>II week</th>
<th>III week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid, mg dm⁻³</td>
<td>29.98</td>
<td>17.15</td>
<td>8.24</td>
</tr>
<tr>
<td>Total sugars, g dm⁻³</td>
<td>99.6</td>
<td>102.4</td>
<td>88.4</td>
</tr>
<tr>
<td>Acidity, g dm⁻³</td>
<td>1.92</td>
<td>2.36</td>
<td>4.28</td>
</tr>
<tr>
<td>pH</td>
<td>2.75</td>
<td>2.72</td>
<td>2.73</td>
</tr>
<tr>
<td>LABs, lg CFU/cm³</td>
<td>5.67</td>
<td>5.87</td>
<td>6.32</td>
</tr>
<tr>
<td>Yeasts, lg CFU/cm³</td>
<td>5.47</td>
<td>5.75</td>
<td>6.62</td>
</tr>
</tbody>
</table>

Table 3. Dynamics of chemical and microbiological characteristics of beverage №3 during the fermentation

<table>
<thead>
<tr>
<th>Characteristic, dimension</th>
<th>I week</th>
<th>II week</th>
<th>III week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid, mg dm⁻³</td>
<td>28.44</td>
<td>24.91</td>
<td>7.45</td>
</tr>
<tr>
<td>Total sugars, g dm⁻³</td>
<td>53.0</td>
<td>38.2</td>
<td>15.6</td>
</tr>
<tr>
<td>Acidity, g dm⁻³</td>
<td>3.69</td>
<td>3.68</td>
<td>4.42</td>
</tr>
<tr>
<td>pH</td>
<td>2.70</td>
<td>2.75</td>
<td>2.83</td>
</tr>
<tr>
<td>LABs, lg CFU/cm³</td>
<td>5.20</td>
<td>6.04</td>
<td>6.04</td>
</tr>
<tr>
<td>Yeasts, lg CFU/cm³</td>
<td>5.79</td>
<td>5.57</td>
<td>5.57</td>
</tr>
</tbody>
</table>

Conclusions. The time for fermentation is shortened by a week, compared to the traditional technology. The process of extraction of nutrients and biologically active components is also enhanced, more markedly expressed when sugar and yeasts are added to the substrate. The bioactive components of lingonberries are well preserved in all three samples of beverages.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (P7/2007-2013) under grant agreement n. 227718, project BeSeFood.
COMPARATIVE STUDY ON FOOD SENSORY CHARACTERISTICS OF TRADITIONAL AND NEW PRODUCTS BASED ON OLEAGINOUS PRODUCTS

Alexieva I.*, Terzieva V.*, Brasilianska V.**, Mirkova I.*, Buhalova Dr.*, Miley M.**

* Dep. of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria
** Dep. of Statistics and Informatics, University of Food Technologies, Plovdiv, Bulgaria
† Institute of Food Research, Plovdiv, Bulgaria

INTRODUCTION

Oleaginous products are very characteristic for Bulgaria and Bulgarian food. Nowadays, there is a lot of interest to these products because of their healthy properties.

MATERIALS AND METHODS

Sensory profiles of traditional sunflower (SFH) and sesame tahini (ST) halva are developed by trained panelists. Differences are identified between the flavour, colour and texture profiles of traditional tahini halva and samples made of walnut (WH), hazelnut (HH), pumpkin seeds (P3H), peanuts (PH) and almonds (AH). Hunter L,a,b and CIE Lab L*,a*,b* colour characteristics are defined by the method of Garner on colorimeter Colorgard 2000, BYK – Gardner Inc. (L – brightness; L=0 – black, L=100 – white; a+ - red, a- – green; b+ - yellow, – b- – blue). Statistic analysis of data is performed, using ANOVA. The texture of tahini halva samples is measured on TEXTURE ANALYSER TA.XT_plus, with 50 kg load cell using a P/5 Cylindric probe 5 mm in the penetration depth 5 mm. Test results are obtained from 20 halva tests of each type. Effect of the halva compositions on the texture, associated with their hardness are studied. Statistic analysis of data is performed, using Stable Micro Systems software, England.

RESULTS

Colour characteristics of the studied seven samples of tahini halva vary, according to the type of Oleaginous product. The values L* are within the limits of 63.10 (HH) and 76.60 (SH); a* range from -2.77 (P3H) to 7.46 (AH) and b* - from 23.25 (PH) to 31.28 (AH).

Texture modifies depending on the oleaginous products. The samples made of almond and pumpkin seeds are substantially hard and adhesive than the traditional sunflower and sesame tahini halva. Tahini halva with walnuts, hazelnuts and sesame have considerably lower characteristics of hardness. It is almost 30% lower that the one with almond. Closer to the hardness characteristics of the sunflower traditional halva is the peanut halva.

The samples of halva are arranged, according to hardness characteristics as follows: pumpkin seeds > almond > sunflower > peanut > sesame > hazelnut > walnut. Correlation is established between the sensory panelist perceptions of hardness and the instrumental analysis.

The development of new products based on oleaginous products contributes for their popularization and increasing their usage.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118, project BaSeFood.
**Introduction.** Bread has significant place in the daily menu of the Bulgarians. It is a staple food, which provides major sources of carbohydrates, proteins, vitamins and minerals in the diet. Studies have shown that whole grain cereals contain a range of bioactive compounds - phenoic compounds, phytoestrogens, dietary fibers (mainly beta-glucan), lignans, alykesorinosol, phytic acid, γ-oryzanol, avenanthramides, cinamic acid, ferulic acid, inositol and betaine, vit. B1 etc. Bioactive components are associated with reduced risks of cancer, diabetes, cardiovascular diseases, etc.

**Results.** Composition of bread varies according to the characteristics of the geographic region – in Trakia and Dobruja – it consists mainly of wheat; in the mountainous areas – of rye, millet or later of maize; in the Rhodope, Rila and Pirin regions - baked potatoes are added. Two basic types of bread are prepared – 1) “prensik” or “plaga rila” (medenik), kolache (without a starter); 2) “kvasnik”, loaf bread with leaven or yeasts. The technology and composition of both traditional breads is studied in the area of Plovdiv, Sliven, Dobrich, Ivailovgrad, Bansko Dospol and Haskovo.

**Materials and methods.** Herbs, typical for Bulgarian consumer like “maintherka” (Thymus serpyllum (Th. chamae)), “matcchina” (Medicago officinalis), “rigan”, “svakarski bosilek” (Origanum vulgare) are used. Earth apple (Helianthus tuberosus) has been a source of dietary fiber. Bread is produced by traditional technology. The bread volume is measured, according to BST (BDS) 3417:1979. The form stability is determined by the H:O ratio; porosity is characterized through image analyzing technique. Phenolic compounds are identified by HPLC.

**Conclusions:** Some attempts to enrich traditional bread with biologically active components has been made.
The increasing wellbeing awareness raises the interest towards cereal based fermented products. Fermentation increases the nutritive value, improves health beneficial composition and the degree of absorption of macro- and microelements. Tarhana is amongst the traditional Baltic foods. The paper studies the specific characteristics of the technology and the ingredients of Bulgarian tarhana. It investigates the effect of the fermentation and type of flour on the physicochemical and microbiological characteristics.

Three samples of tarhana are studied, prepared by traditional technology of the region of Silien but varying the flour composition: wheat flour (WF), lice (LF) and with earth apple (Jerusalem artichoke) in place of wheat flour (WF) + earth apple (JA). The results of the microscopic and biochemical analysis, the chemical composition, the microbiological characteristics, the physicochemical characteristics of the final product and the organoleptic evaluation were determined. The shelf-life of the product was studied under laboratory conditions.

**Results**

During the fermentation of WF tarhana, the number of LABs ranges between 1.1x10^6 to 1.9x10^6 CFU/g, reaching 1.9x10^8 CFU/g after drying. Moisture is reduced from 49.02 to 11.45%. Yeasts reach 2.6x10^6 CFU/g in the dried product. The final product is characterized with pH value 4.43 and ash content 1.37%. LF tarhana shows LABs varying from 1.0x10^7 to 1.0x10^9 at the end of the fermentation. The dried tarhana is characterized with LABs, 2.6x10^6 CFU/g, pH 4.58, ash content 3.16%. Yeasts are reduced from 1.4x10^7 to 1.5x10^6 CFU/g. Diatomaceous dust and lichen dust increase the number of LABs from 5.0x10^7 at the beginning of the process to 1.1x10^9 CFU/g at the end of the fermentation. After drying, LAB of tarhana with TF increases more than 3 times reaching 3.7x10^9 CFU/g, pH value of the dried final product with TF is 4.7, ash content 2.94% mg/g. Yeasts in all the studied three samples measured 2 times during the process of fermentation. The low moisture content (9.1%), low water activity (0.407) of the final product, the pH value (4.4-4.7) provide a bacteriostatic effect against growth of pathogenic and spoilage microorganisms and increase the shelf-life of the product.
Textural changes during water cooking of emmer whole, pearled and crushed grain

Federico Balestra, Elisa Giambanelli, L. Filippo D’Antuono
University of Bologna, Food Science University Campus Cesena, Italy
elisa.giambanelli@unibo.it

Introduction
Emmer is a tetraploid species and its cultivation began during the Bronze Age. It was mainly consumed after it was crushed and reduced to very small pieces and boiled at length in water. Traditionally, in Garfagnana, pearled grain was used in the preparation of soups, while in central Italy (Umbria and Lazio) soups were prepared with coarsely broken seed. Whole grain is a relatively new product, used in the same way as pearled grain. Recent studies conducted on rice samples found that cooking quality, as well as textural attributes, were affected by degree of milling. In the case of rice, the degree of milling exhibited positive effect on water uptake rate, volume and length expansion ratio, cohesiveness, adhesiveness, and negative impact on optimum cooking time and hardness. To our knowledge, none has yet demonstrated the effect of boiling in water on the textural properties of cooked emmer wheat. Therefore, the objective of this study was to compare different products, as whole, pearled and crushed grain, after various times of cooking.

Materials and Methods
Two landraces of Triticum durum from Italy were selected: winter type from Garfagnana (Toscana region), for which we considered whole and pearled grain, and a spring type from Monteleone di Spoleto (Umbria region), for which we had whole, pearled and crushed grain. The samples were subjected to boiling in water and four cooking times were employed: 20, 40, 60 and 120 minutes for the whole; 20, 40, 60 and 80 minutes for the pearled; 20, 30, 40 and 60 minutes for the crushed.

Results
The longer cooking time for each product, taken into account during the experiment, was chosen as a function of the complete absorption of the cooking water. Dry matter of raw materials ranged between 0.877-0.890; this value decreased rapidly with the boiling in water. The lowest value was shown by crushed seeds, for which dry content resulted 0.201 after 20 minutes of cooking.

As expected, the hardness and crispiness for pearled and crushed grain decreased with increasing cooking time. In particular, hardness for pearled emmer wheat assumed the highest values after 20 minutes of cooking, for the winter type it was 242.0 kg, and it decreased more slowly, if compared with the spring type where the initial value of 201.2 kg fell to 77.6 kg at 80 minutes. Crushed seeds had the lowest hardness (from 40.3 to 10.2 kg). Different was the case of the whole product that seems to be less sensitive to boiling in water, keeping almost constant hardness, even after 80 minutes.

Crispiness showed the same trend already observed for hardness. The highest values were found for pearled of the winter type after 20 and 40 minutes, with 4187 and 4092 respectively; while the initial crispiness of 4228, found for the pearled spring was immediately subject to decrease. Crushed showed the lowest values of crispiness with an initial value of 118.2. For the whole grain were obtained intermediate values that ranged between 3343 and 3779. In particular, this parameter decreased after 40 minutes, to return to the initial value after 80 minutes, in both the whole seeds. Adhesiveness was found for all pearled and crushed samples, and for whole wheat wheat only after 120 minutes of cooking. In pearled winter this parameter appeared after 40 minutes of cooking, immediately assuming the highest value (3.7°) and stabilizing around this (3.7° - 3.17), in pearled spring it was present even after 20 minutes, but it was maintained in the range 3.70 - 1.50, while in crushed were found the lowest values (0.61 - 1.23).

Conclusions
The aim of this research was to evaluate the textural changes of emmer wheat used to realize traditional dishes. Cooking time is useful in order to evaluate seeds cooking quality. Longer cooking times, necessary in the case of whole grain, result in a loss of nutrients and could limit use, but don’t affect the textural properties (hardness and crispiness). Ideological properties are important parameters which play a key role in processing seeds. Pearled products showed higher initial values for hardness and crispiness but they were subjected to a faster decrease with the cooking process. The consumers and processors prefer varieties with low cooking time and low hardness value, characteristics found in the present research, for pearled and crushed grains.

Acknowledgements: The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118, project BuSeFed.
Drying effect on Lazoul quality (Allium roseum L.): a Tunisian edible wild plant

L. Bezi-Haï-Saïd*, H. Najia*, M. Nefart†, S. Bellagha*

*Tunisian National Institute of Agronomy INAT, University of Carthage, Tunisia.
† Range Ecology Laboratory, Institute of Arid Areas INRA, Medenine, Tunisia.
* bellagha.sihamb@gmail.com

Introduction

Lazoul (Allium roseum L.) is a common spontaneous edible plant that grows in the south-east of Tunisia during rainy season. Its leaves are consumed by the local population because of their distinctive taste and traditional therapeutic properties. Fresh leaves cannot be preserved due to their high water content. However, drying process is expected to affect content, activity and bioavailability of bioactive compounds.

Material and methods

Plant material: Allium roseum, was collected at its vegetative stage in January 2011 from the south-east of Tunisia. Botanical identification was carried out in the range ecology laboratory of the institute of arid areas, Tunisia.

Drying processes: Experiments are conducted at three air temperatures (40, 50 and 60°C) and at two air drying velocities (1 and 1.5 m/s).

Bioactive composition: Volatile sulfur compounds, total polyphenols content (TPC) and total flavonoids content (TFC) were analysed on fresh and dried leaves (Devento et al., 2002). Antioxidant activity was estimated by the method used by Millaukas et al. (2004) and Chan et al. (2009).

Results and discussion

Whatever air drying velocity, color loss was found to be very important at high drying temperature. This effect could be due to the degradation of chlorophylls (Quiroz and Barroca, 2011). Effect of air drying velocity is statistically insignificant.

Table 1: Total polyphenols content (TPC) and total flavonoids content (TFC) of fresh and dried Allium roseum leaves at different conditions.

<table>
<thead>
<tr>
<th>Drying conditions</th>
<th>TPC (mg GAE/100g DM)</th>
<th>TFC (mg QE/100g DM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh leaves</td>
<td>1.645±0.348a</td>
<td>3.344±0.185a</td>
</tr>
<tr>
<td>1m/s 40°C</td>
<td>0.396±0.026b</td>
<td>2.837±0.048b</td>
</tr>
<tr>
<td>50°C</td>
<td>0.584±0.044b</td>
<td>2.160±0.075c</td>
</tr>
<tr>
<td>60°C</td>
<td>0.549±0.041c</td>
<td>2.160±0.039d</td>
</tr>
<tr>
<td>1.5m/s 40°C</td>
<td>0.697±0.025b</td>
<td>2.370±0.055c</td>
</tr>
<tr>
<td>50°C</td>
<td>0.651±0.030b</td>
<td>2.813±0.102d</td>
</tr>
<tr>
<td>60°C</td>
<td>0.549±0.033c</td>
<td>2.457±0.067e</td>
</tr>
</tbody>
</table>

Fig. 1: Effect of drying temperature on Lazoul leaves aspect

Convective drying results in losses in total polyphenols content of Allium roseum leaves for all drying conditions (Tab 1). Losses varied from 60 to 69%. Temperature increase results in reduction in polyphenol losses. These results could be attributed to the nactivation, at high drying temperatures, of enzymes responsible to polyphenols oxidation such as polyphenol oxidase and peroxidase present in plant materials (Gupta et al., 2011).

The reduction of total flavonoids content varied from 17 to 26% and was found relatively lower than that of total polyphenols (Tab 1).

These results could be explained by higher thermostability of flavonoids than other polyphenols such as anthocyanins and tannins (Im et al., 2011).

A decrease of 72 to 88% in antioxidant activity of Allium roseum leaves following thermal treatment was observed for all drying conditions (fig.2).

Fig. 2: Effect of drying conditions on antioxidant activity loss of Allium roseum leaves

Conclusion

Convective drying resulted in significant changes in colour, declines in total polyphenols and flavonoids contents and in antioxidant activity of Allium roseum leaves. These losses are significantly related to drying temperature. Mild temperatures should thus be used in order to guarantee the best preservation of bioactive compounds which characterize this plant and to assure the protection of its biological activities.
The influence of raw materials and flow chart modification on characteristics of rye bread

T.G. Bogatyreva, D.V. Karpenko
Moscow State University of Food Productions, Moscow, Russian Federation

Modifications of the traditional flow chart are the next:
1) the usage of pure culture of homoliferative thermophilic lactic acid bacteria instead of mixed cultures of lactic acid bacteria and yeast.
2) the usage of buckwheat flour instead of wheat flour.

Reasons:
- to increase the biological value of bread due to its enrichment by bioactive metabolites by homoliferative thermophilic lactic acid bacteria;
- to increase the bioavailability of bread due to its enrichment by bioactive components of buckwheat flour, according to nutritionists, buckwheat - it is one of the most beneficial for health cereals. It regulates fat metabolism, eliminates toxins and reduces blood sugar levels. Nutritionists recommend increasing of cellulose intake in order to maintain health at the proper level. A distinctive feature of the buckwheat is that contains two types of cellulose - insoluble and soluble. Insoluble fibers restore intestine microflora and act as a kind of scrub for the stomach, taking away all chemical wastes. Soluble fibers (beta-glucans), is well known as the remedy that lowers blood sugar levels. Its also reduce requirements in insulin and reduce the secretion of gastric juice. Unlike other cereals, buckwheat contains in its structure a unique complex of organic compounds, which are indispensable in the treatment of celiac disease and phenylketonuria;
- to improve the organoleptic characteristics of bread.

Sampling points are marked on flow charts as numbers in red circles

Characteristics of rye-wheat-buckwheat bread samples obtained according to the traditional and the modified flow charts

<table>
<thead>
<tr>
<th>Points of sampling in the traditional flow chart</th>
<th>D-LA</th>
<th>L-LA</th>
<th>Σ L.A</th>
<th>Vit C</th>
<th>Starch</th>
<th>Dist. fib</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dough</td>
<td>853</td>
<td>900</td>
<td>1843</td>
<td>&lt; 0.3</td>
<td>180.0</td>
<td>5.70</td>
<td></td>
</tr>
<tr>
<td>2. Dough after fermentation</td>
<td>665</td>
<td>792</td>
<td>1567</td>
<td>&lt; 0.3</td>
<td>207.2</td>
<td>6.61</td>
<td></td>
</tr>
<tr>
<td>3. Bread</td>
<td>834</td>
<td>176</td>
<td>2013</td>
<td>&lt; 0.3</td>
<td>201.6</td>
<td>7.05</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Points of sampling in the modified flow chart</th>
<th>D-LA</th>
<th>L-LA</th>
<th>Σ L.A</th>
<th>Vit C</th>
<th>Starch</th>
<th>Dist. fib</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dough</td>
<td>738</td>
<td>881</td>
<td>1621</td>
<td>&lt; 0.3</td>
<td>264.7</td>
<td>5.88</td>
<td></td>
</tr>
<tr>
<td>2. Dough after fermentation</td>
<td>1272</td>
<td>1371</td>
<td>2640</td>
<td>&lt; 0.3</td>
<td>267.0</td>
<td>6.28</td>
<td></td>
</tr>
<tr>
<td>3. Bread</td>
<td>1531</td>
<td>1611</td>
<td>3148</td>
<td>&lt; 0.3</td>
<td>237.9</td>
<td>9.31</td>
<td></td>
</tr>
</tbody>
</table>

D-LA = D-lactic acid; L-LA = L- lactic acid; Σ L.A = lactic acid; total: Vit C = vitamin C; Dist. fib. = dietary fibers.

The traditional flow chart

| Specific volume, cm³/1g
| 1.6 |
| 1.7 |
| 45.3 |
| 45.5 |
| 2.7 |
| 5.5 |
| Porosity, % |
| 45 |
| 50 |
| Organoleptic indicators, Σ of points |
| 76 |
| 76 |

Conclusions:
1. Modification of raw materials and the flow chart allowed to obtain final product with higher content of dietary fibers.
2. Modification of raw materials and the flow chart allowed to obtain final product with higher content of lactic acid.
3. Physico-chemical and organoleptic indicators of new sort of bread are the same or a little better than of traditional one.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227118.
Spicing step effects on quality of Kaddid: a Tunisian cured meat

Meriem Chabbough, Khansa Ben Mekki, Ali Sahli, Silhem Bellagha
National Agronomic Institute of Tunisia INAT, University of Carthage, Tunisia.
merchab@yahoo.fr, sahli_inat_tm@yahoo.fr, bellagha.silhem@gmail.com

INTRODUCTION

In Tunisia, Kaddid is a typical meat product elaborated traditionally by salting, spicing and sun drying of beef or lamb meat. Kaddid meat spicing, depending upon regions, is realized with different aromatic substances aiming mainly to enhance the final product flavor. The purpose of this work was to study the spicing effects on salted meat physicochemical and microbial characteristics.

Meat preparation

- Fresh beef meat (Bos taurus) at approximately 48 h post-mortem were cut into slabs (5 cm x 2 cm x 0.5 cm).

Salting procedure

- Meat samples were brine salted (21 % w/w) at a ratio of 1:2.5 (beef:brine) during 8 h.

Spicing procedure

- Spices paste were elaborated from red pepper (43 %), fresh garlic (33 %), coriander (21 %) and dried mint (3 %).
- Salted meat were spiced at a ratio of 0.15 g spices/g salted meat during 24 h at 4 °C.

MATERIAL AND METHODS

Physicochemical analysis

- Moisture and salt contents were determined according to AOAC (2000).
- Water activity was measured with an a_w meter instrument (HygroLab 3, Rotronic, France).
- pH were measured using digital pH-meter (Orion Star, Thermo Fisher scientific, USA).

Microbiological analysis

- Microbial analysis of cured meat samples were run for total mesophilic aerobic flora, total facultative anaerobic bacteria, total staphylococci, sulfite-reducer bacteria, Clostridium perfringens, Staphylococcus aureus and Salmonella spp. according to protocols described by Tomlinson (1995).
- Statistical analysis
  - Statistical difference in means was performed by the analysis of variance (ANOVA) followed by the Tukey test with a confidence interval of 95 % (p < 0.05) using STATISTICA Version 10 (StatSoft Inc., Tulsa, USA).

RESULTS AND DISCUSSION

Effect of spicing on physicochemical characteristics of salted beef meat

- Spices addition to brined beef meat has no significant effect (p < 0.05) on pH and water activity values (Table 1).
- Water and salt contents of brined meat samples showed a significant decrease after spicing (p < 0.05). Thus, it was observed a reduction of 4.47 % and 8.76 % in water and salt contents, respectively. This could be attributed to the use of spices having low water (495.29 g kg⁻¹) and salt (539.31 g kg⁻¹) contents (Table 1).
- After 24 h of spicing at 4 °C, no change occurred on pH, water activity, water and salt contents values of spiced-salted beef meat have been observed (p < 0.05).

<table>
<thead>
<tr>
<th>Samples</th>
<th>pH</th>
<th>a_w</th>
<th>Water content (g kg⁻¹)</th>
<th>Salt content (g kg⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spices</td>
<td>4.61±0.06 a</td>
<td>0.894±0.001 b</td>
<td>495.29±1.101 a</td>
<td>539.31±0.41 a</td>
</tr>
<tr>
<td>Brined</td>
<td>5.57±0.13 b</td>
<td>0.811±0.002 b</td>
<td>634.87±1.14 c</td>
<td>156.59±1.43 c</td>
</tr>
<tr>
<td>Spiced-brined</td>
<td>5.26±0.03 b</td>
<td>0.805±0.006 a</td>
<td>606.53±2.27 a</td>
<td>144.64±2.81 a</td>
</tr>
<tr>
<td>Spiced-brined after 24 h</td>
<td>5.30±0.19 b</td>
<td>0.816±0.002 a</td>
<td>601.96±4.50 b</td>
<td>149.58±0.88 b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Samples</th>
<th>TMAF</th>
<th>TC</th>
<th>FC</th>
<th>SRB</th>
<th>S</th>
<th>YM</th>
<th>LAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spices</td>
<td>6.51 d</td>
<td>4.86 c</td>
<td>3.45 c</td>
<td>2.70 a</td>
<td>5.68 b</td>
<td>5.65 b</td>
<td>3.40 b</td>
</tr>
<tr>
<td>Brined</td>
<td>5.18 a</td>
<td>2.06 a</td>
<td>1.22 a</td>
<td>ND</td>
<td>4.36 a</td>
<td>5.33 ab</td>
<td>2.32 a</td>
</tr>
<tr>
<td>Spiced-brined</td>
<td>5.93 b</td>
<td>3.36 b</td>
<td>2.37 b</td>
<td>2.37 a</td>
<td>5.63 b</td>
<td>5.47 b</td>
<td>2.85 a</td>
</tr>
<tr>
<td>Spiced-brined after 24 h</td>
<td>5.96 c</td>
<td>2.87 a</td>
<td>1.82 a</td>
<td>2.8 a</td>
<td>5.49 b</td>
<td>5.13 a</td>
<td>2.37 a</td>
</tr>
</tbody>
</table>

|       |       |       |       |       |       |       |       |

RESULTS AND DISCUSSION

Effect of spicing on microbial characteristics of salted beef meat

- Results of microbial tests of cured meat samples before and after the spicing step showed lower counts than recommended standard (AFSSA, 2008). All cured meat samples analyzed were free from Staphylococcus aureus, Clostridium perfringens and Salmonella spp (data not shown).
- Counts of sulfite-reducer bacteria which was initially absent in brined meat reached a value of 2.8 log CFU/g in spiced brined meat samples.
- Total staphylococci count showed an increase of 26 % after the spicing step. In the other hand, facael coliforms flora count underwent a reduction of 18 %.

Table 2: Microbiological characteristics of spices, brined beef meat samples before and after spicing and at the end of the spicing stage.

CONCLUSION

Spices addition decreased the water and salt contents of salted meat. At the end of the spicing stage, physicochemical characteristics of brined beef meat were not affected. However, spicing changed microbial characteristics of the product by sulfite-reducer bacteria growth, increasing total staphylococci and reducing facael coliforms proliferation.
Spicing step effects on drying behavior of Kaddid: a Tunisian cured meat

Meriem Chabbouh, Khansa Ben Mekki, Sihem Bellagha, Ali Sahli
National Agronomic Institute of Tunisia INAT, University of Carthage, Tunisia.
merchab@yahoo.fr, bellagha.sihem@gmail.com, sahli_inat_tn@yahoo.fr

INTRODUCTION

Kaddid is a Tunisian meat product prepared traditionally by salting, spicing and drying of beef or lamb meat. The artisanal process of Kaddid meat elaboration is very time consuming since this typical product is still sun dried. Thereafter, to develop a better controlled drying process a preliminary study of the drying behavior of salted and spiced meat is required. The present work aims to investigate the effect of spicing on isochoric sorption isotherms and drying kinetics of salted beef meat.

MATERIAL AND METHODS

Meat preparation
- Fresh beef meat (Biceps femoris) at approximately 48 h post-mortem were cut into slabs (5 cm x 2 cm x 0.5 cm).
- Salting procedure
  - Meat samples were brine salted (21% w/w) at a ratio of 1.25 (beef brine) during 8 h.
- Spicing procedure
  - Spices paste were elaborated from red pepper (43 %), fresh garlic (33 %), coriander (21 %) and dried mint (3 %).
  - Salted meat were spiced at a ratio of 0.15 g spices/1 kg salted meat during 24 h at 4 °C.

Moisture diffusivity determination
- Apparent moisture diffusivity (D_a) was calculated by the solution of Fick's second law of diffusion for an infinite slab (Crank, 1975):
  \[ D_a = \frac{8}{\pi^2} \sum_{n=0}^{\infty} \frac{1}{(2n+1)^2} \exp \left( \frac{(2n+1)^2 \pi^2 D \cdot t}{L^2} \right) \]
  - MR: Dimensionless moisture content ratio (-).
  - t: Drying time (s).
  - L: Thickness of the slab (m).

Physicochemical analysis
- Moisture content was determined according to AGAC (2000).
- Water activity was measured with a HygroLab 3 instrument (Rotronic, Croissy Beaumont, France).

RESULTS AND DISCUSSION

Effect of spicing on isochoric sorption isotherm of salted beef meat
- Experimental isochoric sorption isotherms at 30°C of brined and spiced-brined beef meat show a sigmoid curves of type III (Fig. 1) according to the classification of Brunauer et al. (1938).

![Figure 1. Isochoric sorption isotherms at 30°C of salted and spiced-salted beef meat](image)

- Similar trend were reported for slatced alligator's meat (Lopes Filho et al., 2002).
- Spices addition did not affect the sorption behaviour of salted meat (Fig. 1).

Effect of spicing on drying kinetics of salted beef meat

Experimental drying results exhibited a reduction in drying process time when salted meat was subjected to a previous spicing treatment (Fig. 2). After 15 h of drying, the water content in spiced-salted meat reached a value of 32.01 % (DB) while salted meat presented a higher moisture content (68.48 % DB).

![Figure 2. Drying kinetics at 30°C of salted and spiced-salted beef meat](image)

- The higher drying rate observed in spiced-brined meat could be attributed to a faster water migration to surrounding air from external spices layer than from the mono-layer salted meat.
- These observations are confirmed by the calculated values of apparent moisture diffusivity which are 5.34 x 10^-10 m^2/s for spiced-salted meat against 2.57 x 10^-10 m^2/s for salted meat.

CONCLUSION

Spicing as a pre-treatment to kaddid meat drying step has no significant effect on the sorption behaviour of salted beef meat. However, it increases the drying rate of the salted meat.
Bioactive compound retention factors as a function of kale cooking time and way: boiling vs. steaming

Federico Feroli, Elisa Giambanelli, L. Filippo D’Antuono
University of Bologna, Cesena, Italy
e-mail: federico.feroli@unibo.it

Introduction
Kale is a leafy green vegetable belonging to the Brassicaceae family that shows a high nutritive value due to its richness in bioactives such as glucosinolates (GLS), phenolics, and vitamins. Kale leaves represent a characteristic ingredient in the preparation of traditional dishes such as soups or filling of pastries. Boiling in water is a common preliminary step in the preparation of kale leaves. Nevertheless, this process may lead to significant losses and degradation of phytochemicals. Steaming appears as an alternative way of cooking, since it would lead to similar leaf texture and a higher retention of healthy compounds. The object of the present study is to compare the effect of boiling and steaming as cooking methods on the retention factors (RF) of kale leaf bioactives.

Materials and methods
Kale populations were selected from material grown in the same environment (Cesena, Italy). Material was harvested on three subsequent days and each day’s complete replication of all the dishes was carried out. The experimental design derived from a factorial combination of three kale types (Italian, Portuguese, and Turkish), two cooking methods (boiling and steaming), and four cooking times (5, 10, 15, and 30 min). After freeze-drying, phenolics and glucosinolates (GLS) were extracted by methanol/water GLS were quantitatively desulphurated and partitioned by solid phase extraction. Pigments were recovered by trihydroxyflavone (THF). Bioactives were quantified by high performance liquid chromatography (HPLC) and identified by HPLC-mass spectrometry (MS) or standard compounds. Analytical determinations were performed on raw leaves (control) and cooking waters.

Boiling
- Cooking time: 5, 10, 15, 30 min
- Boiled samples (B)
- Raw leaves + Cooking waters

Steaming
- Raw leaves + Cooking waters
- Steamed samples (S)

Experimental plan
Bioactive extraction
Retention factors (RF)

Legend to figures I, P, and T stand for Italian, Portuguese, and Turkish samples, respectively. B and S stand for boiled and steamed samples, respectively.

Fig. 1. Trend of phenolic retention factors (RF) in kale leaves.

Fig. 2. Trend of phenolic retention factors (RF-H2O) in kale leaves including cooking waters.

Fig. 3. Trend of GLS retention factors (RF) in kale leaves.

Fig. 4. Trend of GLS retention factors (RF-H2O) in kale leaves including cooking waters.

Fig. 5. Trend of lutein retention factors (RF) in kale leaves.

Fig. 6. Trend of beta-carotene retention factors (RF) in kale leaves.

Fig. 7. Trend of chlorophyll a retention factors (RF) in kale leaves.

Fig. 8. Trend of chlorophyll b retention factors (RF) in kale leaves.

Results and discussion

Phenolics
- Steaming did not cause a consistent phenolic loss in kale leaves regardless cooking time. RF decrease noticed in boiled leaves was due to bioactive migration from raw material to cooking water.

GLS
- Both boiling and steaming led to a RF decrease.
- In steamed leaves, RF decreased at a slower rate but after 20 min RF were similar to those determined in boiled samples.
- Including GLS detected in cooking waters, RF calculated for boiled leaves at different cooking stages were higher than RF determined in the corresponding steamed samples.

Carotenoids
- Most treatments, especially boiling made carotenoids easier to be extracted in cooked than in raw leaves.

Chlorophylls
- Steaming led to a faster decrease in chlorophyll RF in comparison to boiling. After 20 min, RF ranged from 0.6 to 0.7 mg mg⁻¹ for chlorophyll a and b in boiled samples whereas RF ranged from 0.1 to 0.4 mg mg⁻¹ in steamed leaves.

Concluding remarks
- A significant migration of hydrophilic bioactives (phenolics, GLS) from leaves to boiling waters was noticed.
- Phenolics proved to be more resistant to chemical degradation than GLS and chlorophylls.
- Steaming lead to a faster degradation of GLS and chlorophylls in comparison to boiling owing to leaf exposure to oxygen.

Research funded under FPT EU Project BaSeFood, grant agreement n. 227118.
Retention factors of bioactive compounds during water cooking of emmer wheat whole, pearled and crushed grain

Elisa Giambanelli, L. Filippo D’Antuono
University of Bologna, Food Science University Campus, Cesena, Italy
elisa.giambanelli@unibo.it

Introduction
Traditional emmer wheat use as human food are rather specific. In fact crushed kernels are used to prepare soups or porridges. Nowadays, pearled and whole kernels are also very popular as ingredients of soups and mixed salads. In all cases boiling in water is the cooking used to prepare the most common dishes. This has therefore been considered as the critical unit operation for bioactive retention. Cooking in water was almost never considered, apart from some experience on pasta cooking, and never for whole or crushed grains. The available literature is therefore only indicative of the changes that may occur in whole or crushed kernels after cooking in water.

Materials and Methods
Two landraces of Triticeum dicoccum from Italy were selected: a winter type from Barbagona (Toscano region), for which we considered whole and pearled grain, and a spring type from Monciano di Spoleto (Umbria region), for which we had whole, pearled and crushed grain. The samples were subject to boiling in water and four cooking times were employed:

20, 40, 60 and 80 minutes for the whole;
20, 40, 60 and 80 minutes for the pearled;
20, 30, 40 and 60 minutes for the crushed.

After cooking the grain was drained from water, freeze dried and stored at -20°C until extraction of phenolic and lipid associated compounds (tocopherols, carotenoids and phytosterols): the cooking water was stored at -20°C until the phenolic extraction.

Results
Yield factors were calculated for the fresh and dry matter (Figure 1), considering emmer wheat and the water as their sum; the main differences were found for fresh matter in crushed samples whereas, after 60 minutes, we obtained yield factors of 5.0 g g⁻¹ for the cooked grain, due to water absorption, and 0.1 g g⁻¹ for the water, due to evaporation.

Lipid content of raw material was between 1.60-2.07%. Pearled and crushed samples resulted slightly poorer in bioactives with respect to the whole. Retention factors (RF) were calculated for each class of bioactives analyzed (Figure 2). Tocopherol-RF were initially constant for pearled samples, reaching 0.8 between 60-80 minutes; instead for whole and crushed grain it decreased immediately after 30 minutes. Carotenoid-RF and sterol-RF ranged between 0.8-0.9 after 20 minutes; to decrease until 0.6 at the end of the cooking, when considered crushed and pearled grain of the spring type. The lowest values were shown by free phenolic compounds: in all the samples decreased sharply after 20 minutes (0.40-0.60), to return up to 1 after 80 minutes of cooking; this was due to the fact that the grain retained boiling water and it was difficult to separate it at the time of draining. Bound phenolic compounds-RF were maintained around 1; only considering pearled water it decreased up to 0.73 to return to 1 at the end of the cooking. Bound phenolic compounds-RF, calculated including cooking water, ranged between 0.9-1.3; crushed samples showed the highest value only after 20 minutes, while the same level was found for whole grain around 80 minutes of cooking.

Conclusions
This experiment represents one of the first works about the study of bioactives retention after water cooking of emmer wheat (whole, pearled or crushed grain). Tocopherols and carotenoids were partially affected by the boiling in water; free phenolic compounds decreased rapidly, to return to 1, so they leached immediately in the water but the cooking had no effects on these. Up to 90% of dry matter was found in the cooking water, where the crushed grain was boiled. Non-polar components weren't found in cooking water, whereas we could identify various phenolic acids belonging to the bound fraction.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227718, project BaseFood.
Introduction

Emmer and einkorn wheats are the two hulled wheat species being considered in detail within BaSeFed. Grain removal represents the preliminary essential step to human consumption of hulled wheat kernels. This procedure was traditionally carried out by means of stone mills that, however, also caused the breaking of kernel. As a consequence, the traditional and practical method was dependent on the available technology for this key process. An experiment has been carried out to compare the traditional processing, still used in Turkey and Armenia for primitive wheats, and the updated procedure, found in Italy.

Materials and Methods

On-plant samplings were carried out in Turkey, August 2012, on einkorn wheat bulgur, and in Armenia, November 2010, on einkorn wheat. The individual fractions of processing were accurately weighed to calculate yield factors. The kernel fractions were whole and broken kernels from different sieving fractions in all plants in Italy. In Italy, also pelleted grains and the resulting bran fractions were sampled from a specific process line (Table 1). Each fraction was used to determine the content and retention of some bioactive compounds (phenolic and lipid associated compounds: tocals, carotenoids, and ethanol), with respect to whole grain.

Table 1

<table>
<thead>
<tr>
<th>Tag</th>
<th>Description</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFPL</td>
<td>Total phenolic; lipids + tannins</td>
<td>Turkey, P1</td>
</tr>
<tr>
<td>TFPR</td>
<td>Total phenolic; lipids + furaldehyde</td>
<td>Turkey, P2</td>
</tr>
<tr>
<td>PFPL</td>
<td>Phenolic plus lipids</td>
<td>Italy</td>
</tr>
<tr>
<td>PFPR</td>
<td>Phenolic plus lipids</td>
<td>Armenia</td>
</tr>
<tr>
<td>TFPL</td>
<td>Total phenolic; lipids</td>
<td>Turkey, P1</td>
</tr>
<tr>
<td>TFPR</td>
<td>Total phenolic; lipids</td>
<td>Turkey, P2</td>
</tr>
<tr>
<td>PFPL</td>
<td>Phenolic plus lipids</td>
<td>Italy</td>
</tr>
<tr>
<td>PFPR</td>
<td>Phenolic plus lipids</td>
<td>Armenia</td>
</tr>
</tbody>
</table>

Results

Yield factor of processing steps were calculated for each plant (Figure 1) yield of de-hulling ranged between 0.70-0.81 kg kg⁻¹, and the highest value was obtained for the Italian sample, for which the grains were removed by means of special machines that minimized kernel breaking. Yield of food product with respect to the whole de-hulled kernel (0.82-0.96 kg kg⁻¹), and technological yield global yield (0.56-0.98 kg kg⁻¹) assumed higher values, except for P2 from Turkey, where the sieving process was conducted manually. Moreover, yield factors of each individual processing fraction were calculated. Lipid content ranged between 1.79 and 2.58%, if not considered the wastes from the Italian plant 3.15% for wheat from crushing, and 7.65% for the waste from pelleting (Figure 2).

Waste from pelleting was very rich in sterol (3123 mg/kg) and phenolic compounds (1763 mg/g of oil) and 3646 mg of furaldehyde, respectively, for PFC and LPC.

Retention factors (RF), calculated with respect to the input of the process, resulted characteristic for the plant (Table 2). Generally, higher values were obtained for the peeling output (0.99 for carotenoids).

Wastes from pelleting and from crushing showed lower RF (from 0.12 for tannins and carotenoids, to 0.37 for PFC).

Crushed coarse from Armenia had very similar values to those observed for crushed from Italy. In Turkish plants pial reached the highest retention factors and P1 revealed a better performance respect to P2.

Table 2

<table>
<thead>
<tr>
<th>RF</th>
<th>Lipids</th>
<th>Tannins</th>
<th>Carotenoids</th>
<th>Starch</th>
<th>LPC</th>
<th>PFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIB2</td>
<td>2.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>PIB3</td>
<td>0.08</td>
<td>0.12</td>
<td>0.82</td>
<td>0.00</td>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>PIB4</td>
<td>0.14</td>
<td>0.13</td>
<td>0.64</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PIB5</td>
<td>0.07</td>
<td>0.05</td>
<td>0.05</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PIB6</td>
<td>0.19</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PIB7</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PIB8</td>
<td>0.09</td>
<td>0.06</td>
<td>0.32</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PIB9</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Figure 1

Waste from peeling very rich in sterol (3123 mg/kg) and phenolic compounds (1763 mg/g of oil) and 3646 mg of furaldehyde, respectively, for PFC and LPC.

Figure 2

Conclusions

The kernel breaking of hulled wheat in traditional and modern processing is substantially different. The whole grain was richer in bioactives and it was noted that, in traditional processing, main losses occurred during the first steps, while in the Italian plant these were more evident for the output from crushing. In the case of the Italian plant were analyzed the waste from peeling too, that resulted the richest in bioactives, when considered the concentration, but it had a lower retention factor, due to its smaller weight.
Introduction
Peripheral parts of wheat grains (hulls, aleurome, germ) in the milling process mainly form by-products: bran and shorts. Since the streams are derived from different anatomic parts of grain, they differ in chemical composition, biochemical and technological properties. The main objective of this study was the selection of peripheral parts of grains fractions that would improve the content of bioactive substances in wheat flour, dietary fiber and its technological properties.

Material and Methods
For obtaining wheat flour with high content of peripheral parts grain we used: 1st graded flour in blends with bran, break and reduction shorts. First grade flour contained 32% wet gluten of the first quality group. Protein content was determined by the standard Kjeldahl method, lipid content by the Soxhlet method (using hexane as solvent), wet gluten content and its quality by the standard method of the determination of gluten quantity and quality. Fatty acid composition of lipids was determined by GLC techniques. Electrophoretic separation of enzymes was performed. Densitometry of the gels was performed using “Ultrascan” densitometer.

Results
With increasing amounts of bran or shorts in the flour blends, bread volume yield increases: by 9-14% if mixed with the bran and by 4-9% with the break and reduction shorts. The yield decreases with increasing proportions of bran, break and reduction shorts above 14-17%. The content of dietary fibers and ash increases most intensively with adding bran. Amount of gluten in the flour decreases by 4.5-5.8% at a ratio in the blend of flour and bran 80:20 compared to the amount of gluten in original flour. Improving the baking properties of flour is most pronounced in mixes with 1st grade flour due to high content of gluten in comparison with the flour of the highest grade for all blends. We also investigated changes in the properties of certain enzymes and storage proteins in blends of graded flour with the peripheral parts of the grain. It was found that the properties of the peripheral parts of the grain are characterized by significantly higher activity of proteolytic enzymes and SDG than the grain flour.

Conclusions
Streams of wheat milled fractions including peripheral parts of grain improve the content of bioactive substances and dietary fiber in blends with wheat graded flour. Dosage of bran, break or reduction shorts lead to increase of gluten; the bread volume yield increases due to increased amount of unsaturated acids in blends. The best biochemical composition and baking properties was obtained for coarse break bran. The peripheral parts of grain have a higher activity of proteolytic enzymes. The introduction of peripheral parts into the flour leads to increase in activity of hydrolytic enzymes and to significant increase in antioxidant activity that minimizes the negative effect of hydrolytic enzymes on the technological properties of flour.

Acknowledgements
Research funded by FP7 EU project BaseFood, grant agreement n. 227118.
EFFECT OF BRAN ENZYMES ON WHEAT FLOUR QUALITY
Leonid Kapelyants, Dmitry Zhygunov, Arsen Petrosyants
Odessa National Academy of Food Technologies, Odessa, Ukraine
leonid@naft.edu.ua

Introduction
A special role in changing the baking properties of flour belongs to enzymes. The quality of gluten is predominantly influenced by proteolytic enzymes. Increased proteolytic activity leads to the disaggregation of protein molecules, increased levels of soluble nitrogen, the accumulation of free amino acids, decreasing of gluten and particularly gliadin fractions, resulting in deteriorating of technological properties of flour. In this connection it was interesting to determine enzyme activity in the peripheral parts of the grain that may be related to changes in protein and starch of dough. In this work we determined the activity of proteolytic and amylolytic enzymes, protease inhibitors and the activity of the enzyme system that regulates the intensity of free radical processes: superoxide dismutase (SOD).

Material and Methods
Enzyme separation performed using electrophoresis and isofocusing in the polyacrylamide gel. Densitometry of the gels was performed on the “Ultrascan” densitometer, with computer processing of the results. The activity of proteolytic enzymes was determined by the casein method and inhibitory activity by using the method of A. P. Levitsky, amylose activity, according to A. I. Ermankov, SOD activity by following C. O. Beachamp and I. Fridovich.

Results
The activity of proteolytic, amylolytic enzymes and the content of inhibitors in different products obtained during processing of wheat grain were investigated. The influence of different streams of bran and shorts on the activity of proteolytic enzymes, superoxide dismutase, trypsin inhibitor content and amylolytic activity in flour mixture have been revealed. The influence of bran addition on high and low molecular weight fractions of gliadin in flour blends was established. It was found that the peripheral parts of the grain are characterized by significantly higher activity of proteolytic enzymes and SOD than the grain and flour. The activity of proteases inhibitors in different types of bran and shorts streams was significantly lower than in flour. Peripheral parts of the grains are characterized by low amylolytic activity.

Conclusions
1. The peripheral parts of the grain have 1.7-1.8 times higher activity of proteolytic enzymes, superoxide dismutase and have low amylolytic activity, they also contain less trypsin inhibitor than grain and flour.
2. The introduction of peripheral parts into the flour leads to increasing in activity of hydrolytic enzymes and to significant increasing in antioxidant activity that minimizes the negative effect of hydrolytic enzymes on the technological properties of flour.
3. Increasing the number of peripheral parts of grain in flour reduces its high molecular weight. In this case, quantitative redistribution of protein fractions takes place due to changes in protein fraction of gluten. At the same time, qualitative composition of individual fractions of gliadin remains constant, according to results of gels densitometry.

Acknowledgements
Research funded by FP7 EU project BaSeFood, grant agreement n. 227118.
Introduction

Many studies indicate the possibility of enhancing the nutritive value of cereal-based products by supplementation of white bread with minerals, dietary fibers or polyphenols. The main purpose of this study is to analyze three important bioactive components for each selected food (total phenolic content, carotenoids, and dietary fiber). The study characterized the determination, and chose the best flour blends and sources of phytochemicals and dietary fiber. In this study, we investigated the content of polyphenols, β-carotene, and dietary fibers in composite flour blends based on wheat flour, cereal grains, and bran from different fractions.

Material and Methods

Samples were selected from composite flour blends. There were wheat of four extra class, wheat of four extra class 93%, wheat bran 7%, wheat of four extra 93% + wheat bran 17%, wheat of four extra class 90% + barley flour 10%, wheat of four extra class 85% + barley flour 15%, wheat of four extra class 90% + buckwheat flour 10%, wheat of four extra class 90% + wheat bran 2%, wheat of four extra class 40% + rye flour 60% and bread from these blends. A second analysis was performed. Also, we analyzed wheat grains, rye grains and barley grains.

Results

Studies have shown that blends of wheat of four extra class 83% + wheat bran 17%, wheat of four extra class 60% + rye flour 40% and wheat of four extra class 40% + rye flour 60% had the best preventive properties. They contain 0.84, 0.77, 1.155 mg/g of TPC, 0.073, 0.07, 0.108 mg/g of carotenoids, and 8.88, 0.83, 1.47% of dietary fibers, respectively. Bread baked from these blends similarly contained the higher amount of the determined compounds than traditional bread. Research on cereal milling by-products has shown them as a rich source of polyphenols, carotenoids and dietary fibers that could be used as dietary supplement in traditional bread production. Additionally, 4th break system, the coarse fraction of wheat bran and breaking 8th break system the coarse fraction of rye bran containing 2.11, 2.2 mg/g of total phenolic compounds, 0.123, 1.8 mg/g of carotenoids, and 46.5, 49.4% of dietary fibers, respectively. Total phenolic contents was measured using the Folin-Ciocalteu reagent. Analysis of β-carotene in cereals was performed by the spectrophotometric method. Determination of total, soluble and insoluble dietary fibers was carried out by enzymic and gravimetric methods.

Conclusions

Cereal grains contain a great amount of bioactive compounds and dietary fibers, but during wheat milling the level of them reduces almost to zero. Therefore, it is necessary to enrich wheat flour with its native compounds such as polyphenols, carotenoids, and dietary fibers. This can be achieved by producing the composite flour blends based on cereals.

Acknowledgements

Research funded by FP7 EU project BaSeFood, grant agreement no. 227118
The influence of a flow chart on characteristics of kvass “Southern”

D. V. Karpenko, E. A. Beteva, A. N. Khechetnikova

Moscow State University of Food Productions, Moscow, Russian Federation

The main features of kvass “Southern” traditional flow chart are:
- the usage of dried crusts from rye bread as the main raw material;
- the usage of bakery yeast for the fermentation of the wort obtained from dried crusts.

Modifications of the traditional flow chart are the nest:

1) the usage of a concentrate of kvass wort instead of dried crusts from rye bread as the main raw material.

Reasons:
- simplifying of kvass preparation;
- concentrate of kvass wort now is usual raw material in kvass production at any industrial level (small, medium or large);
- commercial concentrates of kvass wort now are habitual raw materials for kvass preparation in households as opposed to dry crusts.

2) the usage of lactic acid bacteria in addition to bakery yeast for the fermentation of the wort.

Reasons:
- enrichment of ready kvass with metabolites of lactic acid bacteria;
- formation of typical, sourish-sweetish taste of kvass;
- expression of undesirable microflora in the production process and in ready kvass due to lowering of medium’s pH.

Sampling points are marked on flow charts as numbers in red circles.

Characteristics of kvass “Southern” samples obtained according to the traditional and the modified flow charts

<table>
<thead>
<tr>
<th>Points of sampling in the traditional flow chart</th>
<th>D-LA (mg/L)</th>
<th>L-LA (mg/L)</th>
<th>Σ LA (mg/L)</th>
<th>Vit C (mg/L)</th>
<th>Dist. fib. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rye bread*</td>
<td>1781</td>
<td>2084</td>
<td>4616</td>
<td>&lt;0.3</td>
<td>7.28</td>
</tr>
<tr>
<td>2. Dried crusts</td>
<td>2653</td>
<td>4877</td>
<td>7530</td>
<td>&lt;0.3</td>
<td>12.15</td>
</tr>
<tr>
<td>3. Kvass wort</td>
<td>179</td>
<td>304</td>
<td>482</td>
<td>&lt;0.3</td>
<td>0.21</td>
</tr>
<tr>
<td>4. Fermented kvass wort</td>
<td>253</td>
<td>336</td>
<td>594</td>
<td>&lt;0.3</td>
<td>0.26</td>
</tr>
<tr>
<td>5. Ready kvass</td>
<td>342</td>
<td>353</td>
<td>695</td>
<td>&lt;0.3</td>
<td>0.28</td>
</tr>
</tbody>
</table>

D-LA = D-lactic acid; L-LA = L-lactic acid; Σ LA = lactic acid, total; Vit C = vitamin C; Dist. fib. = dietary fibers; * - results are expressed in mg/kg

<table>
<thead>
<tr>
<th>Points of sampling in the modified flow chart</th>
<th>D-LA (mg/L)</th>
<th>L-LA (mg/L)</th>
<th>Σ LA (mg/L)</th>
<th>Vit C (mg/L)</th>
<th>Dist. fib. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diluted CKW</td>
<td>63</td>
<td>45</td>
<td>109</td>
<td>&lt;0.3</td>
<td>0.11</td>
</tr>
<tr>
<td>2. Kvass wort fermented by LAB</td>
<td>65</td>
<td>56</td>
<td>121</td>
<td>&lt;0.3</td>
<td>0.06</td>
</tr>
<tr>
<td>4. Fermented kvass wort</td>
<td>148</td>
<td>110</td>
<td>269</td>
<td>&lt;0.3</td>
<td>0.18</td>
</tr>
<tr>
<td>5. Ready kvass</td>
<td>184</td>
<td>180</td>
<td>364</td>
<td>&lt;0.3</td>
<td>0.37</td>
</tr>
</tbody>
</table>

D-LA = D-lactic acid; L-LA = L-lactic acid; Σ LA = lactic acid, total; Vit C = vitamin C; Dist. fib. = dietary fibers; * - results are expressed in mg/kg

<table>
<thead>
<tr>
<th>The traditional flow chart</th>
<th>The modified flow chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter, % wt</td>
<td>Dry matter, % wt</td>
</tr>
<tr>
<td>3.7</td>
<td>2.1</td>
</tr>
<tr>
<td>Ethanol, % wt</td>
<td>Ethanol, % wt</td>
</tr>
<tr>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Acidity, cm³ of sodium hydroxide (with concentration equal to 1 gram-equivalent/l) on 100 cm³ of kvass</td>
<td>Acidity, cm³ of sodium hydroxide (with concentration equal to 1 gram-equivalent/l) on 100 cm³ of kvass</td>
</tr>
<tr>
<td>4.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Coloration, cm³ of iodine solution (with concentration equal to 0.1 gram-equivalent/l) on 100 cm³ of kvass</td>
<td>Coloration, cm³ of iodine solution (with concentration equal to 0.1 gram-equivalent/l) on 100 cm³ of kvass</td>
</tr>
<tr>
<td>0.7</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Conclusions:

1. Kvass produced according to modified flow chart has higher coloration that is more habitual to consumers in Russia.
2. Obtained results allow to suppose that in modified flow chart culture of lactic acid bacteria especially introduced in the technological process is growing more intensively than lactic acid bacteria which are naturally present in traditional flow chart.
3. Kvass produced according to modified flow chart has lower content of dry matter that means lower energetic value of ready kvass; that is important for some consumers in Russia.
4. Consumer’s characteristics of both sorts of kvass are similar, but new sort of kvass has more mild taste.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 227118.
Quality comparison of sun dried and microwave dried cherry tomato

Jihene Lassoudi1, Meriem Chaboughi1, Sihem Belaghfa2*
1Tunisian National Institute of Agronomy INIA, University of Carthage, Tunisia.
2sihem.belaghfa@gmail.com

Introduction

Sun dried (SD) tomatoes are traditionally used in culinary Tunisian habits. Currently, a high national and international demand for this product exists. However, sun drying may encounter control and quality problems from weather conditions, dust and insects. Hence, combining microwave (MW) to convective drying (CD) may give an acceptable energy consuming solution and a better quality dried tomatoes. Here, a dried cherry tomato quality comparison is conducted between SD and combined CD and MW.

Material and methods

Raw material
Fresh cherry tomatoes (Lycopersicon esculentum cv. carasalango) used in this study were provided from Djerba, south of Tunisia. Tomatoes samples were sorted visually for colour (bright red), firmness, size (diameter 2.5-3.0 cm) and physical damage absence.

Sun drying(SD)
Cherry tomatoes halves were left to dry directly under sun light, on a plate placed to one meter from the ground to allow the airflow.

Combined drying: Convection drying + Microwave drying(CD+MW)
The cherry tomatoes was dried initially by a convective air at 60°C for 4 hours. Thereafter, semi-dehydrated cherry tomatoes samples were dried by a programme domestic microwave oven (Compact grill Mouins, France) at 2450 MHz and 230W power.

Physicochemical and bacteriological analyses
Titratible acidity, lycopene, vitamin C, colour (CE L* a* b*), total mesophilic flora and mold and yeast were analysed. Analyses were run in triplicate.

Results and discussion

Effect of SD AN CD+MW on quality of cherry tomato

Physicochemical characteristics

No significant difference was found between the titratible acidity and vitamin C content of SD and CD+MW dried tomatoes (fig.1). A better preservation of lycopene content was observed for CD+MW (21.33mg/100g) than for SD (7.33 mg/100g) which may be explained by the much longer exposure time to oxidation agents during SD (Zanoni et al., 1999; Shi et al., 1999).

Microbial analysis shows a very important reduction in all flora for both drying conditions which is essentially due to the decrease of tomato water activity from 0.95 (fresh) to 0.60 (dried).

Colour analyses show a decrease in each of L* a* and b* values as compared with fresh tomato, which may be explained by enzymatic browning occurring at the cut surfaces of the samples (Sharma et Maguer, 1996). However, CD+MW allows a better preservation of tomato colour (ΔE=13.67 against ΔE=20.48 for SD).

Conclusion

The shorter drying time needed with CD+MW ends up with a better biochemical and colour quality of dried cherry tomatoes. In addition, this drying procedure allows controlling drying conditions. However, further analyses have to be run in order to take into account organoleptic quality of SD and CD+MW dried tomatoes.
High pressure homogenization to increase probiotic and quality features of the Italian traditional cheese “caciotta”

Chiara Montanari1,*, Francesca Patrignani1, Giulia Tabanelli2,*, Lorenzo Siloni1, Patrizia Burns1, Gabriele Vindivolo1, Jorge Reineismer1, Fausto Garlini3, Rossella Lanciotti4

1Department of Food Science, Alma Mater Studiorum, University of Bologna, Italy
2Interdepartmental Research Centre of Industrial Agri-Food Research (CRAG-AgriAlimentari), Cesena, Italy
3Unversidad del Litoral, INIAR, Santa Fe, Argentina

Introduction
High Pressure Homogenization (HPH) is one of the most promising alternatives to thermal treatment for food preservation. Moreover, recent patents described its effectiveness, when applied to sub-lethal levels, both to change Lactic Acid Bacteria (LAB) proteolytic patterns and to positively modify their in vivo functional properties, without detrimental effects on their viability.

Objectives
In this perspective, the principal aim of this work was to assess the potential of a HPH treatment, at 50 MPa, in the technological and functional performances of the probiotic Lactobacillus paracasei A13, when co-mululated with the traditional starters, for the production of Caciotta cheese.

Methods
Three types of Caciotta cheese were performed according to the cheesemaking protocols of a local dairy sector:
- cheese type 1 (control, manufactured with the traditional starters);
- cheese type 2 (Caciotta added of de-natured Lactobacillus paracasei A13);
- cheese type 3 (Caciotta added of HPH-treated Lactobacillus paracasei A13).

The HPH treatment at 50 MPa was performed with a Pandra homogenizer (Geo, Vico Sano, Italy).

The proteolytic intent was added five minutes before the addition of rennet. The three types of Caciotta were stored at 4°C. Viability of starters and L. paracasei A13, as well as cheese proteolytic and lipolytic patterns were monitored after cheesemaking followed by 1, 3, 5, 7, and 9 weeks of ripening. Physicochemical and sensorial analyses, at the same time of storage, were carried out. To evaluate the effect of the applied sub-lethal HPH treatment on L. paracasei A13 functional performances, when used as co-starters, its gastric acid resistance was monitored over ripening both in cheese type 2 and 3.

Results
Results obtained showed that L. paracasei A13 maintained high levels of viability (22 and 3 log CFU/g) up to the 14th day of storage in both the Caciotta type 2. The organismic properties evaluated and the FFA content underwent a faster proteolysis in Caciotta cheese containing HPH-treated L. paracasei A13, with respect to the cheese type 1 and 2. Moreover, the PCA of the volatile compounds showed that the cheese type 1 and 2 gave a similar profile to the 2 typical ripened traditional products. The results obtained regarding lipolysis showed a faster initial process in cheeses added with L. paracasei A13. Moreover, L. paracasei showed an increased gastric resistance in Caciotta cheese when previously treated at 50 MPa up to the 14th day of storage.

Conclusions
Data obtained showed that HPH is applied to the probiotic strain, contributed to the modification of the sensorial features of Caciotta cheese, although maintaining high viable viability and resistance to gastric acid, and contribute to the development of the cheese product up to the third week of storage when the cheese is already ripened with respect to the traditional product.

Table 1. Microflora evolution (log CFU/g) in Caciotta cheeses during storage at 4°C

<table>
<thead>
<tr>
<th>Ripening (d)</th>
<th>E. thermus/Atf.</th>
<th>E. perfringens</th>
<th>L. paracasei A13</th>
<th>Monophasic Bile count</th>
<th>yeast</th>
<th>coliformes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.37 (10.13)</td>
<td>0.00 (0.00)</td>
<td>9.20 (9.35)</td>
<td>9.53 (9.12)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7.78 (10.19)</td>
<td>0.00 (0.00)</td>
<td>7.79 (9.39)</td>
<td>9.79 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6.46 (10.16)</td>
<td>0.00 (0.00)</td>
<td>6.84 (9.35)</td>
<td>9.44 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>5.14 (10.09)</td>
<td>0.00 (0.00)</td>
<td>5.14 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4.83 (10.17)</td>
<td>0.00 (0.00)</td>
<td>4.83 (9.40)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>4.52 (10.09)</td>
<td>0.00 (0.00)</td>
<td>4.52 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>4.21 (10.17)</td>
<td>0.00 (0.00)</td>
<td>4.21 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>3.90 (10.09)</td>
<td>0.00 (0.00)</td>
<td>3.90 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>3.59 (10.17)</td>
<td>0.00 (0.00)</td>
<td>3.59 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>3.28 (10.09)</td>
<td>0.00 (0.00)</td>
<td>3.28 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>2.97 (10.17)</td>
<td>0.00 (0.00)</td>
<td>2.97 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>2.66 (10.09)</td>
<td>0.00 (0.00)</td>
<td>2.66 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>2.35 (10.17)</td>
<td>0.00 (0.00)</td>
<td>2.35 (9.39)</td>
<td>9.14 (9.39)</td>
<td>5.0 (5.0)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. L. paracasei A13 gastric resistance in caciotta cheeses

<table>
<thead>
<tr>
<th>Caciotta</th>
<th>% of survival of the strain L. paracasei A13</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 h</td>
<td>99.8 (0.0)</td>
</tr>
<tr>
<td>14 days</td>
<td>98.9 (0.0)</td>
</tr>
<tr>
<td>21 days</td>
<td>98.8 (0.0)</td>
</tr>
</tbody>
</table>

Table 3. Lipolysis (FFA release) in different caciotta cheese types during storage

<table>
<thead>
<tr>
<th>Cheese type</th>
<th>Lipolysis (FFA ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>210.1 ppm</td>
</tr>
<tr>
<td>7</td>
<td>210.1 ppm</td>
</tr>
<tr>
<td>14</td>
<td>210.1 ppm</td>
</tr>
<tr>
<td>21</td>
<td>210.1 ppm</td>
</tr>
</tbody>
</table>

Acknowledgements
The Authors acknowledge the cheese producer Liberti Di Cesare (Bettoneno, Italy) for the support in cheesemaking.

Figure 1. Principal Component Analysis (PCA) of detected volatile molecules during ripening (24 h, 7, 14 and 21 days).

Figure 2. SDS-page of the pH 4.6 soluble fraction during ripening.

Figure 3. Panel test performed on three Cheese types after 14 days of storage.

Characterization of Salama da Sugo, a traditional fermented Italian sausage


* Department of Food Science, Alma Mater Studionum, University of Bologna - via Fossato 44 - 40137 Bologna, Italy  
** Inter-departmental Center of Industrial Agri-Food Research (CIRI Agroalimentare), P.zza Ginostra 10, 47521, Cesena, Italy

Introduction

“Salama da Sugo” is a fermented sausage subjected to a long ripening period (6-8 months) obtained by using rinsed pork lean meat and pork fat mixed with spices (nutmeg, cinnamon, cloves, marjoram) added with salt, curing agents and red wine (1% v/v). It is traditionally consumed after cooking and served with its “sugo”, i.e. the liquid extracted by cooking process. In spite of the limited geographical expansion, it is among the most ancient fermented sausages even if few scientific papers deal with this particular sausage (Giaccone et al. 2003; Titoia et al. 2006). In addition to thermost for KG, the promotion of traditional and peculiar food products such as Salama da Sugo makes necessary further studies aimed to its microbiological and physico-chemical characterization.

Materials and methods

Sausage manufacture: pork lean (subcutaneous neck, tongue: 30% w/w), pork fat (subcutaneous neck, throat: 30% w/w), salt, durum wheat semolina (19%), lactic starter, spices (black pepper and nutmeg powder) and red wine (1% v/v). Commercial starter cultures (containing Staphylococcus aureus and Lactobacillus sake) were added to natural pork bladder (approximately 1200-1500 g), tied by hand and subdivided into mini-parts by inserting an elastic band in the equatorial position for controlling the characteristic appearance (tube) and to ensure with a sparse suspension of the microbial flora. Temperatures were: 9-10°C, RH 80-90%; drying (c. 15-17°C, RH 75-85%); ripening (until 22°C, c. 75-80% RH). Cooking: in aluminum paper-covered bags at 120°C for 2 hours in the oven.

Table 1: Microbial counts (Table 3) and sensory evaluation of “Salama da Sugo” during ripening

Table 2: Percentage of volatile organic chemical families detected by GC-MS-SIM analysis expressed in 5 ppm area concentration

Table 3: Biogenic amines (Table 5): The production of biogenic amines was limited: Histamine and Tyramine were not detected, while cadaverine and putrescine, whose production is mainly attributed to Enterococcus spice (Zanini Gardini, 2006), were detected at low concentrations. The presence of putrescine equipped after cooking due to wine added is confirmed. The biogenic amine present in higher amounts was tyramine, whose concentration revealed slightly higher both in juice and sausages after cooking.

Aroma profiles (Table 4): identified by headspace-gas chromatography, are reported Table 4 and Table 5. The content in volatile compounds are directly correlated with the sensory analysis of the sausages. In conclusion, the use of traditional and peculiar food products such as Salama da Sugo makes necessary further studies aimed to their microbiological and physico-chemical characterization.
OXIDATION AND BIOACTIVE COMPOUNDS EVOLUTION AND RETENTION DURING OILSEEDS TAHIN AND HALVA SHELF LIFE

Federica Pasini *, M. Fiorenza Caboni *, Iordanka Alexieva *, L. Filippo D’Antuono *
*University of Bologna, Cesena (Italy); †University of Food Technologies, Plovdiv (Bulgaria); federica.pasini@unibo.it

INTRODUCTION. Oxidation is the most relevant pathogen affecting particular lipidic foods and it is associated mainly to unsaturated lipids and some minor compounds, as sterols and tocotrienol. Oxidation may occur during production and storage, especially in oxygen-rich, high temperature and high conditions, that are likely to occur in traditional production schemes. For these reasons the shelf life evaluation and bioactive retention of tahin and halva from different oilseed raw materials was evaluated in this work. In particular, here are reported the general results about phenols content, antioxidant activity and peroxide value in samples during their storage.

MATERIALS & METHODS. Tahin and halva samples obtained from seven different oilseeds (peanuts, almonds, walnuts, hazelnuts, sesame seeds, sunflower seeds and pumpkin seeds) and supplied by UFT (Bulgaria), were stored at typical conservation conditions, in the dark, up to a period related to the maximum shelf life reported for traditional procedures. At time distances (0, 1, 3, 6, 9, 12 months) allowing 2 samples for each product during the shelf life cycle, the following determination were carried out: polyphenols (spectrophotometric assay at 280, 300 and 370 nm), antioxidant activity (ABTS* assay), peroxide value (PV) and conjugated dienes (K254) and trienes (K232).

RESULTS. Phenols content evaluated by spectrophotometric assay, and antioxidant capacity, by ABTS method, showed a big variability depending on the kind of raw material and probably due also to the presence of interferences. Sometimes, mainly in tahin samples, phenols increased during storage and this result is could be due to a liberation of bound compounds or to the breaking of complex phenols (Fig.1 and Fig.3). ABTS trend was not always in line with the phenols content and Maillard reaction products could also contribute to the antioxidant activity during the shelf life, explaining high values when phenols are low (Fig.3 and Fig.4).

Also peroxide value (PV) shows different trends for the tahin and halva obtained from the various oilseeds and it reflects the typical gaussian trend of these primary oxidation products (Fig.5 and Fig.6). In some cases, PV was high despite the elevated phenolic content and antioxidant activity (e.g. sunflower products) and this result could be due to a non interaction between antioxidant compounds and lipids. For example, roasting and grinding can cause protein denaturation in some oilseeds and create a reticulum that avoid the interaction between some compounds. Besides, products made by sunflower and pumpkin seeds reached the legal limit for food (4%) The same trend was reported by the conjugated dienes (K252) with a slight increase of this index during storage, whereas conjugated trienes (K232) showed different trends in the various oilseeds and in all of them the halva samples showed higher values than their corresponding tahin for all the shelf life steps (data no shown).

CONCLUSIONS. These results highlight how the duration of storage is an important factor that should be investigated in all lipidic foods. Besides the storage conditions, like he temperature and light, very important is also the raw material quality. In our case, the raw oilseeds didn’t show good chemical parameters and this affected the oxidation quality of the final products (tahin and halva). Also the packaging plays an important role and in this work samples were collected with not suitable and undamaged bionce.
OXIDATIVE REACTIONS, AND BIOACTIVE COMPOUND EVOLUTION AND RETENTION IN OILSEEDS DURING THE TRADITIONAL PROCESSING FROM RAW MATERIALS TO HALVA

Federica Pasini *, M. Fiorenza Caboni *, Jordanka Alexieva *, L. Filippo D’Antuono *

*University of Bologna, Cesena (Italy), **University of Food Technologies, Plovdiv (Bulgaria);
* federica.pasini@unibo.it

INTRODUCTION. Process optimisation and improved retention of key bioactive compounds identified in traditional foods is one of the objectives of the Balsefood project. In particular, the purpose of this study was to evaluate the impact of processing on tahin halva. Tahin halva is a traditional product of the Black sea countries and it is on the first place among the most nutritious and preferred food among the Bulgarians. The traditional technology of production consists in roasting and grinding oilseeds with sugar syrup whisked with a foaming agent. This technology can vary depending on the type of raw material (sesame, walnuts, sunflower, etc). Tahin halva is known to be rich in bioactive compounds that may be however affected by processing.

MATERIALS & METHODS. Samples analysed were 7 different raw seeds (peanuts, almonds, hazelnuts, sesame seeds, sunflower seeds and pumpkin seeds), the same roasted seeds and tahin and halva prepared by them. All samples were supplied by UFT (Bulgaria) and were characterised for their lipid and phenolic bioactive compounds (fatty acids, sterols and polyphenols). The oxidation (peroxides value, conjugated dienes and trienes) and antioxidant capacity (ABTS®- assay) of all the samples were also evaluated. The analyses were carried out at all steps of processing:

- native seeds
- roasted seeds
- seed paste
- halva

RESULTS. Lipid compounds. About the fatty acid characterization, Fig. 1 reports the percentages of Saturated (SFA), Mono-Unsaturated (MUFA) and Poly Unsaturated (PUFA) fatty acids present in the seven seeds and in their different products. A small increase of PUFA is visible for some oilseeds, but in general there were no significant differences in the fatty acid profile from raw seeds to halva samples. MUFA and PUFA content of tahin halva showed a significant difference from the other products, probably due to a mistake in sampling because of the heterogeneity of the sample. Also for sterol content the results were very different depending on the kind of seed utilized and their content and composition didn’t show particular differences during processing. Many samples, in particular sunflower seeds, presented a slight increase in tahin and halva content probably due to the liberation of bound sterols during heating and grinding (Fig. 2).

Phenolic compounds. In walnuts and sunflower seeds, processing caused a significant loss in phenolic compounds, even if, in general, the other samples showed a slight increase of phenols after grinding probably due also in this case to the addition of bound phenolic compounds (Fig. 3).

ABTS assay. The seeds with large amount in phenols had also the highest antioxidant capacity, particularly walnut products. Besides, in many samples halva presented a value higher than the other products, despite to his low phenolic content. Probably some other compounds, like reducing sugars and Maillard reaction compounds, contributed to the final antioxidant activity of halva (Fig. 4).

Oxidative status. The oxidation evolution differs from seed to seed and most of the samples showed more peroxides (PV) after roasting and a decrease of them in halva (Fig. 5). This result should be explained by the peroxide evolution or, after grinding, to an interaction between peroxides and antioxidants. In halva samples it should be due also to a dilution effect. Conjugated dienes (K232) had the same trend observed for the PV with a decrease after grinding step, whereas in the conjugated trienes assay (K286), halva samples had the highest values in despite of the other products who didn’t show particular differences (Fig. 6). In all the oxidative tests, pumpkin seed samples showed the highest values for all the products.

CONCLUSIONS. Until now no experimental evidences support bioactive compounds content and health benefit of halva, so this research is a first study of the principal phytochemicals present in tahin and halva obtained from different oilseeds and nuts. Depending on the seeds, the traditional processing affects in part the bioactive compounds content, where roasting and grinding are the main unit operations responsible for some losses. These steps are also the main cause of the oxidation increase of these products.

Acknowledgements. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227144, project Balsefood.
Microbiological and qualitative characterization of two commercial Tofu types obtained with different processes

Serrazanetti\textsuperscript{b} D.I., Gozzi\textsuperscript{i} G., Campini\textsuperscript{a} L., Guerzoni\textsuperscript{i} M.E., Vannini\textsuperscript{a,b} L.

\textsuperscript{a}Department of Food Science, University of Bologna, Cesena (FC), Italy
\textsuperscript{b}Interdepartmental Centre for Industrial Agri-Food Research, University of Bologna, Cesena (FC) Italy
\textsuperscript{a}l.campini@gmail.com

**INTRODUCTION**

Tofu, a fundamental part of Asian food culture, is a traditional soybean food composed principally of proteins and lipids. Tofu-derived products can be divided into two main categories: a) fresh Tofu, produced directly from soymilk; b) transformed Tofu, produced from fresh Tofu and characterized by a longer shelf life.

In this study two types of commercial fresh Tofu, with a shelf life of 7 days, and two types of transformed Tofu (i.e. fermented and subsequently cured), with a shelf life of 2 years, have been compared in order to determine the microbiological and physico-chemical differences related to the production processes.

**MATERIAL AND METHODS**

The dominant microbial population was determined by plate counting on MRS, M17 and PCA. GC-MS/SPME analysis of volatile compounds was performed according to Serrazanetti et al. (2011). All the GC–MS raw files were converted to netCDF format via Chemstation (Agilent Technologies, USA) and subsequently processed by the XCMS toolbox. The SDS-PAGE analysis was carried out using ReadyProteins Gel, 10–20% resolving gel, 4% stacking gel supplied by Bio-Rad Laboratories. Gels were run in a Mini Protean Cell System with a 100 mM SDS buffer at 250 V for 30 minutes. The level of oxidation was determined by TBA according to Ambaresu and Vijayalakshmi (2007).

**RESULTS**

The GC-MS/SPME analysis revealed that the fresh and the transformed Tofu can be well differentiated on the basis of the total content of alcohols, aldehydes and ketones. In particular fresh Tofu contained more aldehydes with respect to the transformed Tofu, which were characterized by higher contents of alcohols and ketones. The use of Microsporidium as fermenting agent in the transformed Tofu has been identified by the pool of volatiles compared to those detected in the fresh products. In particular, 2-octen-3-ol, ethyl acetate and methyl butyl ketone were present in both V1 and V2 samples and their content increased over the shelf life. Methyl-ketones are generally produced by fungal enzymes from lipids present in the product.

The volatile molecules that exhibited the greatest variations were hexanal and hexanol, as well as acetic acid and l-valerylt-3-ol. The use of Microsporidium as fermenting agent in the transformed Tofu markedly affected the characteristics of the final product, particularly for the presence of phenylethanol and 2-methyl butanal, which contribute to the sensory features of the products.

The transformed Tofu showed the highest malonaldehyde content. Nevertheless, the level of peroxidation decreased during storage. This phenomenon is probably due to the use of F. rubrum, a well known component of the traditional Chinese medicine, used for the treatment of hyper-lipidemia, associated with the risk of atherosclerosis.

The comparison of the viability data of lactobacilli and lactococci in F1 and F2 samples evidenced that both LAB groups are specific spoilage species of fresh Tofu reaching levels of about 8 Log CFU/g. On the contrary, the levels did not exceed the level of 4.5 Log CFU/g in transformed Tofu V1 and V2 over a 38-days storage.

**CONCLUSION**

The results showed that the specific process adopted with the fermenting agent used to produce the two Tofu types strongly affect the organoleptic and nutritional characteristics of the final product.
Bioactive lipids in butter chain production from the Parmigiano Reggiano cheese area

Vito VERARDO1,2, Ana María GÓMEZ-CARAVACA2,3, Alessandro GORI2, Giuseppe LOSI1, Maria Fiorenza CARONI1,2

1 Inter-departmental Centre for Agri-Food Industrial Research (CESA), University of Bologna, piazza dell'Universita' 9, 50121, Bologna (BO), Italy;
2 Inter-departmental Centre for Agri-Food Industrial Research (CESA), University of Bologna, piazza dell'Universita' 9, 50121, Bologna (BO), Italy;
3 Functional Food Research and Development Centre (CIFAF), Health Science Technological Park, Aida del Concorso 3, E-18500, Arinella (Brindisi), Italy;
4 Department of Food Science, Alba Botta, Strada del Bosco N.1, 28030, Casaluzzo (NO), Italy.

Abstract

Butter milk contains hundreds of diverse components. Particularly, the complex composition of milk lipids and their specific structural organization in the form of fat globules of various sizes need to be further investigated to take advantage of their properties for nutraceutical and health applications. The lipocalpction has been influenced by different variables such as breed, feed and technological processing. In the Parmigiano Reggiano cheese area, the milk has been obtained from different cows' breeding and feeding. To produce the Parmigiano Reggiano cheese, every day, the milk from the evening milking is left to rest until morning in large vats, where the fatty part spontaneously rises to the surface. As used as the whole milk from the evening milking vats, and the obtained milk from the morning before is poured into the typical bell-shaped copper cauldron where calf rennet and fermented whey, rich in natural lactic ferments obtained from the processing of the day before, are added. The cream coming from the natural skimming of evening milk represents a by-product from cheese making process but it can be used to produce the butter. The aim of this work was to determine the content of fatty acid and phospholipid components in the butter before production.

Samples

All the samples provided from Parmigiano Reggiano cheese area were collected in the cheese season. Basically, the cream was obtained from milk collected in two different farming. Moreover, two different churning processes were used to obtain the butter.

Methods

- IC
- IB
- IBM
- TC
- TB
- TBM
- Lipo-extraction

Determination of fatty acids by GC-FID

Isolation of phospholipids by TLC and determination of their fatty acids by GC-FID

Results and discussion

The results showed that composition of the traditional samples reported higher content of MUFA and PUFA (Figure 1). IC and IC-IB represented the first and second fatty acids respectively, and traditional samples, the third and fourth fatty acids, respectively, were the industrial samples.

Table 1. Shows the phospholipid content in the industrial and traditional samples.

<table>
<thead>
<tr>
<th>Sample</th>
<th>FE</th>
<th>FE-PUFA</th>
<th>NE</th>
<th>NE-PUFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>50</td>
<td>30</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Traditional</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

The phospholipid composition varied between industrial and traditional samples. FE was the first phospholipid in IC and IB samples, while TC was the first phospholipid in IC and IB samples, while TB was the first phospholipid in IC and IB samples. The industrial phospholipid content was higher in traditional samples. TB phospholipid content was 33 % higher than IC.

The analysis of phospholipid fatty acids reported some interesting results.

Conclusions

The sampling represents the two typologies of products that are present in the Parmigiano Reggiano cheese area. The industrial samples are produced in higher quantities compared to the Parmigiano Reggiano cheese. Effectively, the Parmigiano Reggiano milk production is lower compared to other breeds. Moreover, the traditional churning process is a time consuming and economically disadvantageous, however, the products contain more bioactive lipids that offer obtained from different breeds and industrial processes.
MULTI-COMPONENT MIXTURES OF FLOUR WITH INCREASED NUTRITION VALUE

Dmitry Zhigunov, Oga Voloshenko, Leonid Koprylants
Odessa National Academy of Food Technologies, Odessa, Ukraine
leoniid@onaft.edu.ua

Introduction
Enriching wheat flour with vitamins, minerals, and essential amino acids is relevant today when interest is increasing in "healthy" food. Use of flour from different cereal crops in the composite mixtures can improve the nutritional value of wheat flour due to use of natural supplements. The main objective of the study was developing multi-component mixtures of flour with increased nutrition value.

Material and Methods
Corn, triticale, barley, oats, rice, buckwheat, wheat flours and mixtures based on wheat flour were investigated. Flour samples were obtained either from industry, or using «Buhier» MLU-200 laboratorion mill. Organoletic properties, glassiness of grans, ash content, properties of gluten, physical properties, content of protein, content of free lipids, fractional composition of proteins, the amino acid composition of the proteins, Ca, Mg, P and K have been determined.

Results
Processing of wheat into flour leads to destruction of its vitamins. When corn and rice flours are added, mixture is enriched with vitamins E, B6, biotin. When buckwheat and barley flour are added, vitamin PP increases. Fe content in triticale and buckwheat flour 3-5 times higher than in other cultures. Two-component and multi-component composite mixtures were developed. The use of additives in two-component mixtures without worsening of baking qualities is possible in the amount of 15-18% by weight of wheat flour, while 15-30% of triticale flour can be added. Formulation of multicomponent mixtures is given. Fe content in a mixture no. 1 by 70% higher than in wheat flour, Ca by 72%, vitamin E by 45%. The lysine content is 15% higher with triticale, buckwheat, barley, oats flours and wheat bran. Content of salt- and water-soluble fractions of protein in compositions by 3% higher than in the reference sample. Use of buckwheat and triticale flour (recipe no. 2) by 38% increases Fe content; lysine by 15%. Content of protein fractions decreases by 28%. Ca content is 61% higher than in wheat flour. Use of oat and triticale flour by 30-35% increases Fe content, lysine by 10-15%. Content of protein fractions increases by 30-35%. Ca in the mixture 60-65% higher than in wheat flour (recipe no. 3). It was found that wheat flour must contain at least 25-26% of gluten. Wheat bran in the mixture must have particle size <350 µm, ash <1%, moisture <4.5%, ash <0.5% for mixtures with triticale flour, <0.65% with rice, <0.75% with buckwheat, <0.95% with oat flour. In multi-component mixtures, amount of gluten must be >22%. In the baking trial, there was no deterioration of organoleptic quality of bread. Bread was well-developed, had uniform porosity, smooth surface; crust was without cracks and tasted good.

Conclusions
Composite flour mixture of high nutritional value can be produced by dosing and mixing certain types of flour according to the developed formulation. The optimum mixing parameters are n = 100 min⁻¹ and t = 5-7 min.

Acknowledgements
Research funded by FP7 EU project BaSeFood, grant agreement n. 227118.
Microbiological aspects of traditional foods

Nadila Boyko

*Univiersal National University, Uniferal, Ukraine. Email: nadila.boyko@gmail.com.

Introduction: Delicious traditional foods of Black Sea region (BSAC) contain amazing variety of different local plant components. Biodiversity of national and cross-national recipes is result of long term geographical and historical relations between the populations of belonged countries. The main aim of microbiological investigation of Bulgarian, Georgian, Romanian, Russian, Turkish and Ukrainian ethnic foods selected within BaSeFood project was to characterise their safety and quality issues.

Materials, approaches and methods: Beneficial, potentially pathogenic microorganisms of environmental origin, human contaminants and food borne pathogens had been revealed by biochemical and serological Latex-test (bioMérieux, France), MALDI and PGEF. Standard methodology had been modified and applied to monitor of all the samples. The interrelation of plants and composition of microorganisms had been detected via the four variations of co-cultivation techniques. The traditional foods as unique composition of biologically active plant components and associated microorganisms had been studied for their synergic influence on host immune system reacting in specific way on foreign antigens of different origin.

1 – ANAERO test 22 and ENTERO-test 22 PANEL (Labom Diagnostika s.r.o. Czech Republic)

2 – AP-1 test systems (BioMérieux, France)

3 – Latex-test (Bio-Rad, USA)

4 – Complex chromogenic media

5 – VITEK 1 (BioMérieux, France)

6 – Beneficial microorganisms

LIST OF KEY MICROORGANISMS

<table>
<thead>
<tr>
<th>Foods, amount</th>
<th>Mix/mix</th>
<th>Key microorganisms</th>
<th>Count</th>
<th>Species and Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>62</td>
<td>Shigella flexneri</td>
<td>41/1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>Listeria monocytogenes</td>
<td>4/1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>Staphylococcus aureus</td>
<td>7/42</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>14</td>
<td>Salmonella enterica</td>
<td>9/112/10</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>21</td>
<td>Staphylococcus aureus</td>
<td>5/2210</td>
<td></td>
</tr>
</tbody>
</table>

RESULTS

Conclusions. Microorganisms originated from fermented foods of homemade traditional dishes/beverages are a matter of great importance, since they can be potentially exploited in industrial food processing.
A mini concept based analysis of health promoting traditional food potential, on the basis of expert judgement and consumer expectations

Annachiara Berardinelli 1, L. Filippo D’Antuono 1, Alessandra Bordoni 1, Francesca Danesi 1, Katerina Fedosova 1, Lyudmila Zukina 1, Nelya Koval 1, Nadia Boyko 1, Dmitry Karpenko 1, Carmen Costea 1, Alexandru Stroila 1, Silvia Rascu-Pistoi 1, Ana Varga-Ungureanu 1, Anonietta Branni 1, Elene Saterbashvili 1, Ia Ebralidze 1, Zaza Kikasolov 1, Ioana Alexe 1, Osman Hayran 1, Buke Kocaoglu 1

1 University of Bologna, Cesena, Italy. 1 Odessa National Academy of Food Technology, Odessa, Ukraine. 1 Uzhhorod National University, Uzhhorod, Ukraine. 1 Moscow State University of Food Production, Moscow, Russia Federation. 1 ATR, Bucharest, Romania. 1 Swedish National Food Administration, Stockholm, Sweden. 1 University of Technology, Plovdiv, Bulgaria. 1 Yeditepe University, Istanbul, Turkey.

* annachi.berardinelli@unibo.it

Aim of the research

The present work was aimed at: a) defining the potential of different combinations of concepts belonging to the sphere of traditional foods with health promoting properties; b) assessing the validity of traditional/health promoting food combinations; c) defining the correspondence between expert evaluations and consumers expectations.

Material and methods

165 binary combinations obtained by crossing attributes of three different concepts (carriers, health claims and functional ingredients) were rated by consumers and food experts (marketing experts, nutritionists and food technologists), according to different attributes (Fig. 1), on a five point scale. The results were mainly analysed by means of ANOVA and multiple regression.

Results

Consumers’ ratings of binary combinations were significantly affected by partners, age and education level (Fig. 2). The relations between experts and consumer responses indicate that food experts are sensitive to consumer preference with special respect to market experts (Fig. 3-4), despite an effect of participant partners (Fig. 5). The most promising binary combinations were the carrier “spice or herb” in combination with health claims “strengthens the natural defence of the body”, “reduce certain types of cancer” (Fig. 6), or with functional ingredients “rich in antioxidants” and “in vitamins”. These two functional ingredients were also promising in combination with health claims: “reduces the risk of certain types of cancer and heart diseases”, “keeps your arteries healthy” and “strengthens the natural defence of the body”.

Conclusions

Food experts were sensitive to consumer preference, with special respect to food market experts. The combination of some traditional food types and health claims was generally positively rated with most combinations in the “opportunity quadrant” of the consumers and experts crossing. The high between partner variability suggests to take these results as a preliminary indication of opportunities, to be verified with more specific investigation.

Acknowledgements. This research has received funding from the European Community’s Seventh Framework Program (FP7/2007-2013) under grant agreement n. 227198, project BattleFood.
Generic traditional food perception and specific traditional food attributes rating by consumers of the Black sea area countries


Aim of the research

- To define the concept of a generic traditional food among the Black Sea region populations, on the basis of specific selected attributes, and relate different perceptions to demographic traits.
- To verify the consistency of the emerged generic traditional food with country specific traditional foods, and locate the specific foods in the perceptual dimensions generated by the rated attributes.

Material and methods

A questionnaire was developed including 25 selected attributes (Fig.1), that were rated by consumers of Black Sea area countries and Ukrainian immigrants to Italy. For the concept of a generic traditional food, an ordinal scale was used. With reference to specific traditional foods of specific areas, a binary scale (agree/disagree) was used; the binary data were preliminary log-transformed in a continuous scale by means of logistic regression, for further analysis.

Results

PCA of the generic traditional food rating indicated that descriptors connected to its identification are mainly associated with familiarity, no sophistication, and sensory properties. Among health promoting traits, attributes with a primary role were those directly perceivable (e.g. fibre, calories, natural ingredients) (Fig.2). Demographic characters such as age, ethnicity and education affected the perceptions (Fig.3).

The principal components extracted for specific traditional foods indicate that traditional foods of common consumption were associated with health perception, and being simple and cheap to prepare (Fig.4). Some foods were rated in a consistent way in different contexts (e.g. the eze bread or borshch by Ukrainians) with respect to the individualised perceptual dimensions (Figs.5-8).

Conclusions

A good correspondence was detected between the directly perceivable health promoting and sensory traits in the specific food set and in the characterisation of a generic traditional food. On the contrary, aspects of a generic traditional food more linked to a modern way of life seemed to be in contrast with the perceptions emerged by rating specific traditional foods.

Acknowledgements: This research has received funding from the European Community’s Seventh Framework Program (FP7/2007-2013) under grant agreement n. 227119, project BaSeFood.
Gastronomic tourism in Ukraine

Kateryna Fedosova, Oksana Dyshkantyuk, Sergey Fedosov
Odessa National Academy of Food Technologies, Odessa, Ukraine

Throughout the world, culinary tourism is now very popular and rapidly growing. Gastronomic tourists are traveling to various places to get acquainted with local culinary traditions and characteristics of national or regional cuisine. The main objective of our review is to show the state of the gastronomic tourism in Ukraine.

In Ukraine, culinary tourism has not yet been widely adopted, but this kind of travel is rapidly growing. Firstly, it is represented by the wine routes and “green” gastronomic tourism. The undisputed center of the wine tourism is the southern coast of Crimea. Wine tours usually include a visit to a factory of sparkling wines and other vineyards with wine tasting. Another tour includes a visit to the “Cultural center of wine” in Odessa region located directly on the site of the industrial complex “Odessa”, one of the oldest wine regions of Europe, whose traditions were established ancient times. This is the only Ukrainian Cultural Center, bringing together existing high-tech enterprises, the ancient wine cellars, tasting room, exhibition of contemporary sculpture and architectural art, as well as a unique museum of wine and winemaking.

Center for the “green” gastronomic tourism in Ukraine is its western regions, in particular, Transcarpathia. One of the most developed regions of Ukraine in terms of tourism is Lviv. This is one of the oldest cities in Ukraine characterized by unique flavor and atmosphere. Here, various festivities and fairs are held, and city authorities in every way help to attract tourists and promote the history and culture of this unique city. One of the distinguishing features of Lviv is a huge number of related restaurants, many of which became famous throughout the world. In addition to the original restaurants, Lviv is famous for its coffee and chocolate. Many tour operators offer tours, in which tourists visit Lviv cafes and even participate in the process of making chocolate. Visit of gastronomic festivals are held also in Lviv and Transcarpathia, but unfortunately, still not many tour operators offer organized tours to these events.

As examples, one can mention the “Festival of Brass Band” every summer in Mirozh, the “Festival of Brass Band” in town Buczacz, the festival of culinary art “Collection” in the village of Koritchen (Ternopil region), the “Salo Festival” held annually in Lutsk, “Odessa Kitchen Yard” festival in Odessa, the annual “Festival of Meat” in Zhytomyr, “Festival of Muzak and Omelett in Odessa”, in Kherson, the festival “Hustul’sche” in Lutsk.

Slow Food Festival in Odessa

In Ukraine, culinary tourism is still a rare phenomenon, in spite that there are a lot of thoughtful gastronomic routes. However, in Ukraine, more and more people realize advantages of this direction in the travel business.
Traditional food products and consumers in Western Balkans Countries

BACKGROUND

Background: Balkan countries have a strong heritage of culinary tradition. The consumption of traditional food is therefore strongly connected with their cultural habits. This may have influence on what traditional food means in each country. (Bernardoni et al., 2008)

Purpose:
- Measure the attitudes towards traditional food products expressed by Balkan consumers.
- Assess the purchasing behaviour of Western Balkan’s consumers for traditional food.
- Identify specific segments of consumers sensitive to traditional food.

Research questions:
- What is traditional food in Western Balkan countries?
- Is there a different perception of tradition food between rural and urban consumers, according to the country?
- Are there different segments of consumers sensitive to traditional food?

MATERIAL & METHODS

Same methodology in each country:
- Study of the legal framework for traditional food
- 12 focus groups in 6 countries
- Quantitative survey associated to trade-off measurement (1,200 consumers)
- Analysis with a special focus on homogeneous groups of consumers

Focus on quantitative survey applied to fresh cow cheese (Midić sir):
- Ranking of 11 cards by consumers according to their preferences in a context of purchase.
- Face to face interview with additional questionnaire.

RESULTS

Importance given to attributes by consumers in a context of purchase and their preferences between levels for each attribute:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>25.4</td>
</tr>
<tr>
<td>Quality</td>
<td>31.3</td>
</tr>
<tr>
<td>Availability</td>
<td>38.4</td>
</tr>
</tbody>
</table>

Clusters of consumers:

Cluster 1 (15% / 216 respondents):
- Local origin
- Less before consumption
- Less consumption also child
- Fewer purchases of super-products
- Faster production
- Lower price
- A higher preference for small-scale production

Cluster 2 (19% / 234 respondents):
- Reaction of industrial local
- Reaction of high price
- Reaction of formal product
- Reaction of price
- A lower preference for small-scale production

Cluster 3 (21% / 234 respondents):
- Higher response of local product
- Fewer purchases of formal product
- A lower preference for small-scale production

Cluster 4 (12% / 110 respondents):
- Fewer main courses
- Fewer purchases of formal product
- A lower preference for small-scale production

CONCLUSION

- Consumers express a positive attitude towards traditional food.
- Drivers for traditional food consumption are:
  - To take care of the natural content of food
  - To promote the local or country origin of the traditional food
  - To favour the on-farm and small daily production.
- Key adaptation of traditional foods supply should be aimed to different segments of consumers:
  - Those who...
    - favor local origin
    - favor small or on-farm production
    - seek affordable prices
    - are more confident in industrial products
- Innovation in traditional food is better accepted for dishes than for products.
- Is there a potential market for ready-to-eat traditional dishes sold in supermarkets?
- A need to protect traditional food in order to preserve the strong heritage of Balkan culinary traditions, especially for the new generations, is highlighted.
Consumer's perception of sustainable wine: a literature review

G. Sogari¹, C. Mora¹, D. Menozzi²
¹ Catholic University of Piacenza - Italy
² University of Parma - Italy

Background

Over the last years wine sustainability grew in popularity but currently there is no officially and universally accepted definition of sustainable wine. These circumstances have created a lack of clarity on what exactly means sustainable wine and a different perception concerning wine with eco claims. We focused our research on wines label as "organic", a claim that is well known to be environmentally friendly.

Concepts and theories

First of all organic wine is the most important production method alternative compared with conventional wines. In order to reduce information asymmetry between producer and consumer European Union has implemented organic legislation both at production and labeling level. The goals are:

- Stimulate and improve the production of sustainable wine
- Communicate adequately and avoid any risks of deceptive labeling

What is an organic wine?

European regulation No 203/2012 regards detailed rules on organic wine. Organic wine is made from grapes which are not only farmed organically, but also processed in accordance with the standards of organic winemaking practices.

Results

One of the main conditions for the success of sustainable wines is that customers will be willing to pay a price premium.

More expensive

More natural and healthier

Lower sensorial quality

More environmentally friendly

New EU organic logo
(mandatory on the wine label from 1st of July 2012)

Commission Implementing Regulation (EU) No 203/2012 (it applied from 1st of August 2012)

Wine labels as “wine made from organic grapes”

Wine labels as “Organic wine”

Conclusion

The signs of eco-labeling will be one of the major issues in the marketing strategies. Even if price and grape's variety are still the main drivers for choosing a wine, sustainable aspects could become an important attribute and consumers will be willing to pay a price premium.

The authors believe that the wine industry should improve the communication tools to inform consumers about the added value of sustainability. Regarding these considerations researchers forecast that will be a growth of sustainable wine production label with "organic wine" claim and respective logo. These tools will probably reduce information asymmetry in sustainable wine industry.
Innovation disclose consumers’ preferences

The EU FOOD & DRINK INDUSTRY
number one manufacturing Industry in the EU
Generates 1.050 € trillion in turnover representing 13% of EU manufacturing export 53.7 billion €
Employs 4.3 million people 14% of the total jobs in EU manufacturing 310,000 companies (99.1% SMEs)

INNOVATION AND CONSUMERS: The objective
The producers of traditional food represent a particular typology of manufacturers, often believing that food must remain the same and that only small improvements and adaptation to current rules are required. Their concept of food production is based on continuity with the past.
However, the rapid changing in consumer’s preferences require an alerted, flexible and competitive food sector. The modern consumer, without giving up traditions, is asking for new guarantees concerning food safety, long term health effects, sustainable production, social responsibility, animal welfare etc. The main objective of the present report is to investigate about the relation between innovation and consumer’s preference on traditional food, approaching from a manufacturing point of view.

Technological actions impacting at the level of the priorities of the consumers

10% 10% 27% 72% 21%

For 79% of respondents the well-established firms are the most important innovators

Materials and Methods
Development of a questionnaire addressed to traditional food producers of the Black Sea Area. The questionnaires have been submitted to enterprises in different ways: by direct mailing to the network of Food and Drink Federations, during meetings, fairs and conferences. Responding was on a voluntary basis, anonymous and was not subject of any form of payment. The Countries involved are: Greece, Turkey, Bulgaria, Romania. The enterprises involved were all producers of traditional food products.

CONCLUSION
Enterprises, managers, technicians know that being aware of the consumer’s preferences and needs can influence a product or service innovation at any stage of a product’s development. Customers’ ideas and preferences should be a primary source of innovation for companies. Some organisations are ready to use customer demand to influence their own internal innovation. With respect to the survey results, not such a strong link between consumer preferences (from the stakeholder point of view) and innovation choices exists. For example, the major part of respondent considered attributes such as taste, spicy, flavour, smell extremely important to the success of their products, but only 4% of them innovates in the area of Product sensorial properties. When innovations are applied to TFP, the main objective should be to avoid abrupt changes and provide relevant benefit to consumers.

Propensity to innovation in the last three years
THE DARK SIDE OF THE ROMANIAN FRUITS AND VEGETABLES MARKET: CONSIDERATIONS REGARDING THE COMMERCIAL FRAUD EFFECTS ON CONSUMER HEALTH

Tampu Dana Larisa, Costea Carmen, Liderlea Laura Vldeoca
ASE București, Romania

The fruits and vegetables business in Romania have been evolving under mixed economic, social and political pressures, setting nowadays both the economic crisis tensions and specific negative drivers' influences. Between its main disturbance factors acting at local level we outline the Romanian horticulturists' low capabilities to cope with the increased competition from the European Union. Single Market and the local authorities' lack of effectiveness is to cut down the gray and the black market of this industry.

Veg terrain is known as a food source that supports peoples' health. In fact, larger and many times been appearance in the consumption. For example, the increase of consumption of vegetables, fruit and meat are in the season. At the same time, the demand for organic products is growing. In many cases, people are willing to pay a higher price for organic products because they believe that they are healthier and more environmentally friendly.

Due to the lack of proper regulation and enforcement, the production of organic food is often unregulated and not truly organic. This can lead to confusion among consumers and result in false claims about the quality and safety of the food. The lack of traceability and certification systems for organic products can also make it difficult for consumers to know whether the food they are buying is truly organic.

One of the most important considerations for consumers is the price. Organic food can often be more expensive than conventionally grown food. This is because organic farming practices are more labor-intensive and require more time and effort to maintain. However, the higher prices may be justified by the perception that organic food is of higher quality and more nutritious.

In conclusion, the commercial fraud effects on consumer health in the Romanian fruits and vegetables market is a serious issue that needs to be addressed. Consumers need to be informed about the risks associated with buying non-organic food and encouraged to choose products that are grown using sustainable and environmentally friendly practices.
Determining the economic potential of traditional food products in developing economies: Analysis based on Romanian consumers

Authors: Adrian VASILE, Tania Georgia VICIU, Carmen Eugenia COSTEA

Abstract

Developing economies struggle with two very distinct streams of policies regarding food safety and security. Policymakers have to stabilize the market by removing administrative, institutional and legal obstacles that impede the process of accessing regional markets for food products. This paper aims to examine the competitiveness of traditional food products on international markets. The research is focused on the traditional food products in Romania and the factors that influence their competitiveness. The purpose of this study is to contribute to the understanding of the factors that influence the competitiveness of traditional food products on international markets. The research methodology employed in this study includes a literature review and an analysis of data from a survey of consumers. The results of the research indicate that traditional food products have a significant potential for competitiveness on international markets. The competitiveness of traditional food products is influenced by several factors, including quality, price, and marketing strategies. The results of the research also indicate that consumers are willing to pay a premium for traditional food products that are perceived as being of higher quality. The research concludes that traditional food products have a significant potential for competitiveness on international markets if they are produced and marketed effectively. The results of the research can be used to inform policy makers and stakeholders about the potential of traditional food products in developing economies.
AN OVERVIEW OF PORTUGUESE TRADITIONAL FOODS WITH QUALITY PRODUCT DESIGNATION

Tânia Gonçalves Albuquerque*, Ana Sanches-Silva, Filipa Santos, Helena Soares Costa
Department of Food and Nutrition, National Institute of Health Dr. Ricardo Jorge, I.P., Lisbon, Portugal
*tania.albuquerque@nisn.min-saude.pt

INTRODUCTION: Traditional foods constitute an important part of the culture, history, identity, heritage and local economy of a region or country and they are key elements of the dietary patterns of each country [1]. 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 [2]. The Portuguese cuisine is characterized by a variety of rich, filling and fully-flavoured dishes. It is a Mediterranean cuisine, with Atlantic characteristics (high consumption of fish and seafood) and influence from different places around the world. The cuisine across Portuguese regions and islands is varied [3]. In 1992, the European Union (EU) created quality product designation systems, including Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Speciality Guaranteed (TSG), which protect registered traditional foods and enable producers to market distinctive high-quality regional products [4, 5]. In this study, a review among Portuguese traditional foods with quality product designation has been carried out.

CONCLUSION: A great variability of Portuguese traditional foods has already been registered as PDO or PGI. Nevertheless, some of these foods have never been characterized with respect to the nutritional composition and bioactive compounds content. This review aims to compile and update information of the Portuguese traditional foods with quality product designations and to increase interest among food researchers, manufacturers and consumers on these foods.

REFERENCES

Figure 1: European traditional foods with quality designation (1992-2017).
Figure 2: Portuguese traditional foods with quality designation per district.
Figure 3: Portuguese traditional foods with quality designation per category according to QSP database (http://www.europaeagrodoc/cลาดidity.qsp.html).

Figure 4: Ovaria melões de Avelino (application type: TSG; food description: obtained by the addition of sea salt and grated lemon rind to ripe melons).

Figure 5: Critical factors in the composition or origin of PDO and PGI. PDO - Protected Designation of Origin: food is from a geographical area with recognized know-how.
PDI - Protected Geographical Indication: food is from a geographical area and is characterized by the quality, reputation, or other characteristics of its geographical origin.

Across Europe, Portugal is the fourth country with more traditional quality products, after Italy, France and Spain (Figure 1). These four Member States account for almost 65% of all protected names.

In recent years, across Europe, quality products registered as TSG have increased and 55% of the foods were registered after 2000.

In Portugal, up-to-date, there are 116 registered traditional foods with quality product designation, from which 64 are PDO and 52 PGI.

Figure 2 shows the traditional quality products distributed per district. The Portuguese regions with more quality products are “Portalegre” and “Vila Real”.

Those districts are located in opposite regions of Portugal. “Portalegre” is in the region of Alentejo, on the south-central region of Portugal, characterized by a very dry climate for most of the year, with summer temperatures reaching up to 45 °C and mild winters, almost composed of low-lying plains and plateaus of small altitude. “Vila Real” is located in the north of Portugal, which is a region where the weather is much cooler, characterized by mountains and valleys.

According to Figure 3, the categories with the highest percentage of products are fresh meat and meat products, which comprises 17 PDO and 48 PGI foods (around 54% of the quality products). After these, fruits, vegetables and cereals (fresh or processed) is the category with more quality products (14 PDO and 10 PGI).
BULGARIAN STREET FOODS –
CHARACTERISTICS, TRADITIONS, DEVELOPMENT AND CONCERNS

Alexieva I., Baeva M., Milkova I.
Dep. of Catering and Tourism, University of Food Technologies, Plovdiv, Bulgaria

INTRODUCTION
Street food (SF) is part of out-home consumption of food, that is defined as ready-to-eat foods and beverages that are sold, purchased on the street and consumed, usually walking or standing in public places. SF has old, historical roots with complex social-economic and cultural implications. Despite the development of modern fast food, traditional SF persists and is further enriched by the influence of other cultures, technological development and health care awareness.

MATERIALS AND METHODS
Structured face to face interviews; 600 randomly chosen consumers of SF.

RESULTS
Basic groups of traditional SF are characterized and some examples are given. Nutritional and healthy aspects of SF are discussed. Classification is given on the traditional SF according to the basic ingredients, technology of production and contribution to the diet. A study on traditional Bulgarian street foods is presented, investigating the local cuisine and the influence of other cultures upon its development. Results show that all of the respondents at least once a day buy SF (including food or drink). About 20% of the respondents rely on SF 3 times per day. The most consumed traditional SF for breakfast are the pastry products – "banitsa" (40%), "kifla" (25%) and "tutmanik" (15%) combined with "bozo" (45%), "sirian" (22%) and soft drinks (20%) for the teenagers; coffee (80%) for the older respondents. The traditional SF menu for lunch favours pastry products (40%) and grilled meat (35%) preferred for dinner too. Amongst the new SF, introduced as a result of the influence of the other cultures, most favorite are pizza, "hotdog" and "cuner kebab". Significant correlation is found between SF consumption and the income of the respondents, although the first factor influencing the choice of SF foods is the convenience concerning the fast service and saving of time which is more important for the man, than for the women. The low price is a decisive factor for 47.2% of the respondents. Men being more sensitive to food costs than women. SF is more preferred by the age group 10-35 years. The negative perceptions of SF are: unclean, unhygienic, fatty and unhealthy, filling up heavy on the stomach, difficult to digest. The positive opinions of SF are: "fast, easy-to-eat, clean, fills you in; easy to buy; available everywhere, low price. A survey on 50 SF stalls show that in 70% of them good hygiene and production practice is implemented, according to the existing Food Law, 20% - not fully; 10% - not at all.

CONCLUSIONS
With the expansion of SF in the last 20 years, basic concerns are for food safety and health effect of the street foods. Globalization and fast invasion of foreign cuisines threatens unification of the SF offer and the identity and attraction of traditional street food.

Acknowledgements: The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118, project BaSeFood.
Bulgarian traditional foods reflect dietary habits that have been developed over more than 1330 years of history. They have been influenced by geographic and climatic conditions, agrarian practices, availability of products, development of technology and communications, way of life, cultural exchange, invasions, religious beliefs, habits, etc. Although they differ from one region to another, there are some basic and common features that give them Bulgarian accent.

Peculiarities of Bulgarian cuisine
The methods of cooking are confined to boiling, stewing and roasting or baking. Grilling is applied to young meats and vegetables. The cooking process takes place at considerably low temperatures for a longer period of time; this gives rise to certain almost baking type products. All the ingredients are put together and jointly cooked, which develops a specific characteristic harmony of flavours.

Bulgarian cuisine uses vegetable oil, although in the past, oil made of walnuts, sesame or olives has not been available in great quantities (sunflower oil is used since 1978). Consumption of animal fats (lard and tallow) is restricted by the "fast" religious requirements. Meats are cooked in their own fats and juices. Although pork is the main meat source, the frequency of consumption as well as the physical activity and way of life of the ordinary Bulgarian, it does not have negative effect on health. Butter is cooked with vegetables like nettle, sorrel, dock or cereal based dishes like polenta, "kasha" (porridge), etc. or with poultry and lamb. Milk and yogurt are used in cooking. Sharp, spicy and acids foods are not characteristic for Bulgaria. Herbs are used as a condiment ("chubritza"), thyme, "samacluca", "kozha", spare mint, parsley, dill, etc.) or as an essential ingredient of the dishes - nettles, dock, sorrel, "leovec", etc. Herbal infusions are applied in folkloric medicine. Basic ingredients of traditional foods are presented and characteristic representatives are described. Special attention is paid to the cereal products "kasha", "kachamak", "mesenitza", "parentiza", etc., bread and bakery products like "pita", "banitza", "milk", "lilnik", "zelenk", "lubranik", "kolach", "gevrek", etc., dairy products like "kielit mleko"(yogurt), white burred cheese, "katak", yellow cheese, etc. Fermented drinks as "koza", "ljuto", beer and wine are also presented. Specific meat products as "lukeiska", "bavok", "kiflje" and "kebatche" are described.
Street food in the Black Sea regions of Ukraine

S. N. Fedosov, L. V. Kapelyants, K. S. Fedosova
Odessa National Academy of Food Technologies, Odessa, Ukraine

The Black Sea washes the main two regions of Ukraine: Crimea and Odessa region. In the 18th century, 95% of the population of the Crimea was Crimean Tatars. At the beginning of the 20th century in Odessa lived 35% of Jews. Now the Crimea and Odessa area are multi-national regions. In the Crimea live 2.4 million, of which 62% are Russians, 24% Ukrainians and 12% Crimean Tatars. In the Odessa region there are also 2.4 million, of which 65% are Ukrainians and 12% Russians.

Some traditional street foods of the two Black Sea regions of Ukraine are presented here:

- **Shashlik** is a shish-kebab cooked over a wood fire.
- **Lyulya-kebab** is a minced mutton chop cooked over a wood fire.
- **Chebureki** are meat pies filled with lamb or beef and deep-fried in oil.
- **Lagman** is a rich, thick lamb soup with vegetables and long homemade noodles.
- **Fried sunflower seeds**
- **Fried pumpkin seeds**
- **Kvass** is a fermented beverage made from black or regular bread.
- **Thick pancakes (olad'y)** with sour cream or honey.
- **Pancakes (bliny)** with sour cream or honey.
- **Pancakes (blinzhiki)** with meat, or cottage cheese.
- **Vertuta** is a spiral dough roll filled with apples, cottage cheese, meat, or onions.
- **Plachinte (platasinda)** is a traditional pastry filled with pumpkin, cabbage, cheese, potatoes, meat, or apples.
- **Dumplings (vareniki)**. Filling: potatoes, sauerkraut, mushrooms, sour cherries, fish or meat, home cheese, millet or buckwheat porridge, spinach, onion, apples, etc.
- **Round fried meat pies (belyashi)**
- **Salted vobla (Caspian roach) (taran)**, a common Ukrainian snack that goes well with beer.
- **Paklava** is thin layers of homemade dough, deep-fried and covered with nuts and honey.
- **Small boiled shrimps (rachki)**

Traditional street food is still underdeveloped in the Black Sea regions of Ukraine and requires further development. National traditions are suppressed by the dominance here of foreign products, especially Turkish ones.
STREET FOOD IN GEORGIA

**Churchkhela (Churchkhel)**

Churchkhela is a traditional Georgian delicacy made of walnuts in thickened grape juice. The most common variation is made with walnuts, though other nuts are also used, such as almonds or hazelnuts. The word *churchkhela* is derived from the Persian *kitchen* and *khal*, which means a sweet syrup. The sweet syrup is made from sugar and water. These small sweets are often sold at the market or in bakeries.

**Khachapuri**

Khachapuri is a traditional Georgian dish consisting of cheese dough. It is popularly known as cheese bread. The dough is usually made with flour, yeast, and water, and then baked until it is golden brown. The cheese filling can be made with a variety of cheeses, such as feta or mozzarella, and can be mixed with other ingredients, such as onions or garlic.

**Kutia**

Kutia is a traditional Georgian dish made from wheat berries, nuts, raisins, and honey. It is often served during the Christmas season and is considered a symbol of Goodwill and Peace. The dish is typically prepared by the family and is often shared with friends and neighbors.

**Puri**

Puri is a traditional Georgian dish made from dough and often served as a side dish to the main course. It is similar to a pancake and is usually topped with butter and salt. The dough is made with flour, water, and yeast and is typically fried until golden brown.

**Tbilis khachapuri**

Tbilis khachapuri is a Georgian dish made from cheese bread dough filled with cheese. It is often served as a starter or as a main course. The dough is typically made with flour, water, and yeast and is then baked until it is golden brown. The cheese filling can be made with a variety of cheeses, such as feta or mozzarella, and can be mixed with other ingredients, such as onions or garlic.

As the street food culture in Georgia is family-oriented and consumer-oriented, it is usually influenced by different taste preferences of local people. A number of factors, such as location and time of day, can affect the types of street food available. For example, during working hours, customers might prefer sandwiches and salads, while during the evening, customers might prefer warm and hearty dishes.

In conclusion, the street food culture in Georgia is a reflection of the country's rich and diverse culinary heritage. It is a vibrant and dynamic industry that offers a wide range of options for both local and international visitors. Whether you are looking for a quick snack or a full meal, Georgia's street food scene has something to offer for everyone!
Traditional Food of Georgia

Georgians are very proud of their rich cuisine, which kept its uniqueness through millennia in spite of significant Asian and later European influences and gained its place among world cuisines.

The diversity and richness of Georgian dishes is stipulated by diverse climates of the country (25 soil-climate zones) and ancient agricultural traditions (6th-5th millennium BC), a variety of local and introduced vegetables and fruits, cereals and legumes, wild plants harvested for food, livestock, as well as mushrooms and fish give the opportunity to prepare large number of different dishes.

The main specifics of Georgian cuisine lays in the wide use of large variety of greens, walnuts/nuts, spices, garlic and vinegar for the preparation of both - plant and animal based food, as well as in the use of sour sweet spicy sauces prepared from different fruits and berries: wild plums, blackberry, cornelian cherry, mulberry, grapes, green grapes, etc. It is traditional to serve varieties of fresh fruits and greens during regular meals, as well as pickled vegetables and wild herbs. Fresh barberries, red currants or pomegranate seeds are often used as food relishes.

It should be also mentioned that Georgian cuisine is not homogeneous: it can be divided in west, east and high mountainous cuisines, of which the West Georgian cuisine is most famous for its uniqueness and diversity; high mountains are more characterised by diverse meat based and unique dairy products as well as by use of seasonal wild greens, some of which are also preserved for winter time. East Georgian cuisine is partly influenced by Asian cuisine (mainly Iranian, Turkish and Armenians), however is famous for its delicious and unique breads, fresh and processed fruit & herbs based food like soups and meat or fish dishes.
Traditional food in the Black Sea regions of Ukraine

G. Khomich, L. Kaprelyants, S. Fedosov, K. Fedosova
Odessa National Academy of Food Technologies, Odessa, Ukraine

Only in the Crimea there are such fruits as blackthorn, figs, Crimean cherries, hazelnut, Crimean onion, cherry plum widely used by local people as foods. In the southern areas of Ukraine one can find eggplants and peppers, of which eggplant spread and stuffed peppers are produced locally in many households. Very popular different kinds of porridge (kasha), especially buckwheat kasha, baked millet kasha, pumpkin kasha.

Ukrainian borsch is the traditional staple food for all Ukraine including its Southern Black Seaport. Cabbage and red beet are specific plants very popular in the Ukrainian cuisine. Out of 26 registered in Ukraine foods with some vegetables that contain cabbage or red beet find the following 10 foods contain cabbage or red beet: Ukrainian borsch, green sorrel borsch, dumplings with cabbage or sauerkraut filling (varenyky), stewed cabbage, sauerkraut, white cabbage soup (kapusanka), cabbage rolls (golubtsi), potato cakes with cabbage filling (myrtilka), vinegret (beets, cabbage, potatoes). Other vegetables such as onions, garlic, carrots, turnips, radishes and cucumbers are frequently eaten raw.

Sunflower and pumpkin seeds are usually roasted. Naturally, at the area there are a lot of traditional local dishes from fish, such as pike roe, salted mackerel, freshly salted or stewed mackerel. Black Sea apron smelt, smoked trout, Crimean red mullet. Odessa style fried goby, Black Sea flatfish, red mullet grilled mackerel, trout from tasty. Due to Jewish part of the population, became very popular and traditional in the area such specific dishes as eggplant paste, stuffed chicken neck, stuffed fish, baked pepper with salted sheep cheese (brynza), farshmak (a dish from minced herring baked potatoes with sour cream, onions and peppero) due to Yiddish and Gogaul population, maize sweet bread (mlazky) and maize porridge (mamalyga) became traditional in Odessa region.

Ukrainian cuisine is varied and rich in taste and nutritional value. The exceptional fertility of Ukraine’s soil and climate were favorable to the development of agriculture, which had a marked influence on the type of food. The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 227118, project BokaFood.
Potential Western-Ukrainian Traditional Street Foods

Larysa Buhyna*, Marliia Mudryk*, Olga Levchuk*, Filippo D’Antuono* and Nadiya Boyko*
* Luhansk National University, Luhansk, Ukraine (nadiya.boyko@gmail.com)  
* University of Bologna, Cesena, Italy (filippo.dantuono@unibo.it)

WESTERN-UKRAINIAN TRADITIONAL FOODS ARE VALUABLE SOURCE OF HEALTHY
AND VERY-VERY TASTY
IT WAS USED SO MUCH IN PAST AS STREET FOOD... IT WILL BE USED AGAIN WIDELY IN NEAREST FUTURE...
IT IS MOSTLY NOW PRESENTED, EATEN, TESTED, DISCUSSED DISSEMINATED ON OUR REGIONAL TRADITIONAL FESTIVALS:
of LEKVAR, OF CORN, OF YAPUKY AND MANY OTHERS
WELCOME BACK FOR THE BEST TRADITIONS. ENJOY IT WITH US – SEE THE ACTIONS!!!! AND FEEL THE SMELL AND TASTE !!!!!!
Potential Western-Ukrainian Traditional Street Foods

Larysa Buhyna*, Marlia Mudryk*, Olga Levchuk*, Filippo D’Antuono* and Nadiya Boyko*

*UCHurev National University, Lutsk, Ukraine (larysa.buhyna@gmail.com), * University of Bologna, Cesa, Italy (filippo.dantuono@unibo.it)

Western-Ukrainian traditional foods are valuable source of healthy and very-very tasty. It was used so much in past as street food... it will be used again widely in nearest future...

It is mostly now presented, eaten, tested discuss disseminated on our regional traditional festivals:

of lekvary, of corn, of vafnyv and many others

Welcome back for the best traditions. Enjoy it with us – See the actions!!! And feel the smell and taste !!!!
Street food in Russian Federation

D. V. Karpenko
Moscow State University of Food Productions, Moscow, Russian Federation

Population of the Russian Federation in 2012 is equal to 143 000 000. Representatives of more than 200 nationalities (ethnic groups) are living in Russia with their own habits and preferences. Some all over Russia street foods are presented here

The most popular and well-known

- Morozhenoye - ice cream
- Pochkhi (pyshki) are making from pastry, fried in oil and sprinkled with powdered sugar
- Bliny - pancakes with sour cream, caviar, butter, jam, etc.
- Pirozhki sloyenye are making from foliated pastry and are filling with meat, liver, sorrel, mushrooms, cottage cheese, fruits, berries, etc.
- Kvass - fermented beverage made from rye and other cereals
- Blinchiki - rolled pancakes with different fillers
- Pirozhki - baked pies with different fillers
- Cheboreski - pies with different fillers (usually, meat), deep-fried in oil
- Pirozhnye - small cakes

Especially popular in the Southern regions of Russia

- Shashlik - pieces of meat, fish or vegetables cooked over a wood fire
- Semechki - fried sunflower seeds
- Choorchkhela is preparing from nuts and grape juice gelled by flour
- Varenaya kookoorooza - cooked salted corn

Introduced into Russian market during last 25 years

- Shawarma (shaqurma) - kebab
- Gamboeger - burger
- Hot dog
- Booterbrod - sandwich
- Kotletz (keftezi) - grilled chicken
- Kornoye miaso v panirovke - chiken meat coat with flour
- Pochenyi kartofel - baked white potato with different fillers (cheese, meat, ham, salad, fish) or without it

Acknowledgements. The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n.

227118.
POSTER INDEX

TRADITIONAL FOOD SYSTEMS: RAW MATERIALS, ORGANISATION, CASE STUDIES, ECOLOGICAL AND BIODIVERSITY ASPECTS
1. Ancient Maloideaee and traditional products in the Reggio Emilia Apennines (Northern Italy)
C. Bignami, A. Baroni, C. Barbieri, S. Famularo, S. A. Imazio, G. Montevecchi
2. Cornelian cherry in the Black sea area and Italy: local knowledge, uses and potential for health promotion
3. The concepts underlying traditional fruit product utilisation: an intercultural comparison between Italian and Black Sea region
C. Bignami, L. F. D’Antuono, K. Fedosova, M. Jorjadze, I. Alexieva
4. Black briony (Tamus communis L.) in Italy: traditional uses and foods
L. F. D’Antuono
5. Local corn production and products in Italy: a significant example of chain approach to traditional food recovery from a non native plant
L. Filippo D’Antuono
6. Semi-domesticated herbs in the food tradition of the Romagna area
L. F. D’Antuono
7. Hulled wheat uses and traditional foods, from the Mediterranean to Caucasus
L. F. D’Antuono, B. Koçaoglu, O. Hayran, I. Alexieva, K. Fedosova, N. Darbinjan
8. South European Brassica oleracea leafy types: traditional food and uses in a cross-country, intercultural perspective
9. Kvass – from past to future: changing in time
D. V. Karpenko, E. A. Beteva, A. N. Krichetnikova
10. A typical high energy source traditional food from Turkey: “Tahin with pekmez”
B. Koçaoglu, O. Hayran, L. F. D’Antuono
11. Recovery and utilization of the threatened olive cv Tortiglione
A. Leva, A. Ena, D. Leva
12. Wild plants and traditional foods in Val D’Agri area (Potenza) of Lucania
S. Sansanelli, A. Tassoni

NUTRITIONAL AND HEALTH PROMOTING VALUE OF TRADITIONAL FOODS
13. Comparison of proximate data among traditional foods from Black Sea Area countries per food group
14. Selected traditional foods from Bulgaria in the frame of BaSeFood project
15. Study of the antioxidant activity of selected local Bulgarian culinary spices
I. Alexieva, D. Mihaylova, A. Popova
16. A systematic and comprehensive study of traditional foods in the Turkish food composition database project
B. Amoutzopoulos, G. Biringen Lüker, M. Yaman, S. Ak쿠ş Cevikkalp
17. Selected traditional foods from western Ukraine in the frame of BaSeFood project
18. Effects of 6 weeks consumption of bioactive-rich nettle and Sideritis teas on endothelial function and other markers of cardiovascular disease risk in an at-risk subject group: a randomised controlled trial
T. Chendey, N. Koval, M. V. Rishko, A. Konić-Ristić, M. Glibetić, W. Hollands, P. Kroon
19. Selected traditional foods from Romania in the frame of BaSeFood project
20. Hypcholesterolemic effect of dill and kale extracts: assessing mechanisms of action in hepatic cultured cells
21. Mechanisms for the cholesterol-lowering effect of phytosterols, main bioactives of many Black Sea area traditional foods
F. Danesi, A. M. Gómez-Caravaca, D. de Biase, V. Verardo, A. Pession, M. F. Caboni, A. Bordoni
22. Modulation of antioxidant enzyme gene expression by pomegranate (Punica granatum L.) extract and punicalagin
F. Danesi, S. Saha, M. E. Woodcock, P. A. Kroon, L. F. D’Antuono, A. Bordoni
23. Protective role of Sideritis scardica and Camellia sinensis extracts in oxidatively injured mammalian cells
24. Screening of antioxidant capacity and phenolic content of selected Black Sea area traditional foods
25. Nutrition claims within the EU regulatory context: A potentially important tool for the endorsement of traditional foods of the Black Sea Area Countries

26. Acute effects of hot water infusions of mountain tea, nettle and dill on platelet function in subjects with metabolic syndrome: a randomised controlled intervention study

27. Can bioactive-rich plant food extracts of the Black Sea Region and isolated bioactive metabolites inhibit platelet function?

28. Selected traditional foods from Georgia in the frame of BaSeFood project

29. Effects of 6-week of pomegranate juice consumption on platelet function in subjects with metabolic syndrome: a randomized controlled intervention study

30. Selected traditional foods from Russian Federation in the frame of BaSeFood project

31. Effects of 6 weeks of pomegranate juice consumption on cardiovascular disease risk biomarkers in subjects with metabolic syndrome: a randomized controlled intervention study

32. Development of a national food composition database in Ukraine following EuroFIR and BaSeFood projects

33. Beneficial microorganisms of traditional foods of Black Sea Region and their potential implementation

34. Cells and animal models used for testing of biological active compounds of plant originated traditional foods: results of BaSeFood project

35. The use and extension of eBASIS bioactives database by BaSeFood
J. Plumb, L. De Wael, S. Bell, P. M. Finglas

36. The potential of traditional foods from Black Sea Area as source of vitamins and bioactive compounds

37. Are polyphenols found in plants from the black-sea region able to attenuate TNFα induced increases in adhesion molecules in endothelial cells?

38. Compounds and mechanisms responsible for the in vitro release of nitric oxide in endothelial cells treated with a phenolic-rich pomegranate extract
M. Woodcock, M. Jorjadze, P. Kroon

QUALITY: COMPOSITION, SENSORY AND SAFETY ASPECTS

39. Chemical composition of essential oil of some local Bulgarian culinary spices
I. Alexieva, A. Stoyanova, P. Merdzhanov, T. Sapundzhieva, A. Popova, M. Baeva

40. Food sensory characteristics of traditional Bulgarian fermented beverages based on wild fruits
I. Alexieva, V. Terzieva, Dr. Buhovalova, M. Milev, T. Sapundieva, I. Milkova

41. Content comparison of a natural antioxidant, trans-resveratrol, in a traditional grape-based beverage “hardaliye” and other grape-derived products
B. Amoutzopoulos, G. Biringen Lüker, G. Samur, M. Yaman, S. Akkuş Çevikkalp

42. Ampelographic and chemical characterization of local grapes for ‘saba’ and ‘agresto’ in Reggio Emilia and Modena (Northern Italy)
C. Bignami, A. Antonelli, S. A. Imazio, F. Masino, V. Matrella, G. Montevechi, G. V. Simone

43. Sensory evaluation of edible flowers of wild Allium species used as food in local traditions in Italy
L. F. D’Antuono, M. A. Manco

44. Comparison of leafy kale populations for their bioactive compound content: phenolics, glucosinolates, carotenoids, and chlorophylls

45. Characterization and quantification of bioactive compounds in primitive wheat populations
E. Giambanelli, L. F. D’Antuono, M. A. Manco, O. Hayran, B. Koçaoglu, I. Alexieva, N. Darbinjan

46. Biologically active components in Bulgarian traditional foods with pumpkin (Cucurbita moschata)
I. Obreshkov, I. Alexieva
47. Analytical characterisation of oilseed raw materials used in production of tahin and halva
F. Pasini, M. F. Caboni, I. Alexieva, L. F. D’Antuono

48. Identification of phenolic and glucosinolate bioactives in kale, dill, annual nettle (Urtica urens), Sideritis scardica, persimmon and pomegranate from the Black Sea region using LC-DAD-MS

49. Antibacterial activity of some local Bulgarian culinary spices
T. Sapundjeva, I. Alexieva, N. Boyko, A. Stoyanova, P. Merdzhanov

50. The use of biometrical traits and molecular markers in the characterization of a traditional onion landrace (Cipolla di Giarratana)
L. Siracusa, E. Riggi, G. Avola, G. Ruberto

51. Investigations of polycyclic A hydrogencarbonates levels in traditional smoked fish and meat
V. Sterna, J. Miculis, A. Vaidovska, J. Zults, A. Ernstsons

PROCESSING: TRADITIONAL AND IMPROVED FLOW CHARTS, RETENTION OF NUTRIENTS AND BIOACTIVE COMPONENTS

52. Development of new tahini based products, enriched with biologically active components from local plants
I. Alexieva, M. Baeva, I. Milkova, Dr. Buhalova

53. Effect of processing on some biologically active components in selected Bulgarian traditional foods
I. Alexieva, G. Mechenov, I. Milkova

54. Study on traditional Bulgarian wild fruits fermented beverages
I. Alexieva, T. Sapundjeva, Dr. Buhalova

55. Comparative study on food sensory characteristics of traditional and new products based on oleaginous products
I. Alexieva, V. Terziева, B. Brashlianova, I. Milkova, Dr. Buhalova, M. Milev

56. Study on traditional bread and possibilities of its enrichment with biologically active components
M. Baeva, I. Alexieva, A. Lovchev, Tz. Gogova

57. Study on traditional fermented cereal based foods
M. Baeva, I. Alexieva, T. Sapundjeva, I. Milkova, Dr. Buhalova

58. Textural changes during water cooking of emmer whole, pearled and crushed grain
F. Balestra, E. Giambanelli, L. F. D’Antuono

59. Drying effect on Lazoul quality (Allium roseum L.): a Tunisian edible wild plant
L. Ben Haj Said, H. Najjaa, M. Neffati, S. Bellagha

60. The influence of raw materials and flow chart modification on characteristics of rye bread
T. G. Bogatyr'eva, D. V. Karpenko

61. Spicing step effects on quality of Kaddid: a Tunisian cured meat
M. Chabbouh, K. Ben Mekki, A. Sahli, S. Bellagha

62. Spicing step effects on drying behavior of Kaddid: a Tunisian cured meat
M. Chabbouh, K. Ben Mekki, S. Bellagha, A. Sahli

63. Bioactive compound retention factors as a function of kale cooking time and way: boiling vs. steaming
F. Ferioli, E. Giambanelli, L. F. D’Antuono

64. Yield and bioactive compounds retention factors during hulled wheats traditional processing
E. Giambanelli, L. F. D’Antuono, O. Hayran, B. Koçaoglu, N. Darbinjan

65. Biochemical and baking properties of blends graded flour with different wheat milled products including peripheral parts of grain
L. Kaprelyants, D. Zhigunov, G. Pshenishnyuk, S. Fedosov

66. Effect of bran enzymes on wheat flour quality
L. Kaprelyants, D. Zhigunov, A. Petrosyants

67. Bioactive compounds and dietary fibers in new developed cereal products
L. Kaprelyants, E. Zhurlova, K. Fedosova

68. The influence of a flow chart on characteristics of kvass “Southern”
D. V. Karpenko, E. A. Beteva, A. N. Krechetnikova

69. Quality comparison of sun dried and microwave dried cherry tomato
J. Lassoued, M. Chabbouh, S. Bellagha

70. High pressure homogenization to increase probiotic and quality features of the Italian traditional cheese “caciotta”

71. Characterization of Salama da Sugo, a traditional fermented Italian sausage
C. Montanari, G. Tabanelli, F. Coloretti, C. Chiavari, L. Grazia, R. Lanciotti, F. Gardini

72. Oxidation and bioactive compounds evolution and retention during oilseeds tahini and halva shelf life
F. Pasini, M. F. Caboni, I. Alexieva, L. F. D’Antuono

73. Oxidative reactions, and bioactive compound evolution and retention in oilseeds during the traditional processing from raw materials to halva
F. Pasini, M. F. Caboni, I. Alexieva, L. F. D’Antuono
75. Microbiological and qualitative characterization of two commercial Tofu types obtained with different processes
D. I. Serrazanetti, G. Gozzi, L. Campitini, M. E. Guerzoni, L. Vannini

76. Bioactive lipids in butter chain production from the Parmigiano Reggiano cheese area
V. Verardo, A. M. Gómez-Caravaca, A. Gorl, G. Losi, M. F. Caboni

77. Multi-component mixtures of flour with increased nutrition value
D. Zhygunov, O. Volashenko, L. Kaprelyants

78. Microbiological aspects of traditional foods
N. Boyko

CONSUMERS ISSUES: PERCEPTIONS, ECONOMIC AND IMATERIAL ASPECTS

79. A mini concept based analysis of health promoting traditional food potential, on the basis of expert judgement and consumer expectations

80. Generic traditional food perception and specific traditional food attributes rating by consumers of the Black sea area countries

81. Gastronomic tourism in Ukraine
K. Fedosova, O. Dyshkantyuk, S. Fedosov

82. Traditional food products and consumers in Western Balkans Countries
C. Mora

83. Consumer’s perception of sustainable wine: a literature review
G. Sogari, C. Mora, D. Menozzi

84. Innovation disclose consumers’ preferences
EU Food & Drink Industry

85. The dark side of the Romanian fruits and vegetables market. Considerations regarding the commercial fraud effects on consumer health
D. L. Tampu, C. Costea, L. V. Libardea

86. Determining the economic potential of traditional food products in developing economies: Analysis based on Romanian consumers
A. Vasile, T. G. Viciu, C. E. Costea

SPECIFIC CONTRIBUTIONS ON STREET AND TRADITIONAL FOODS

87. An overview of Portuguese traditional foods with quality product designation
T. G. Albuquerque, A. Sanches-Silva, F. Santos, H. S. Costa

88. Bulgarian street foods – Characteristics, traditions, development and concerns
I. Alexieva, M. Baeva, I. Milkova

89. Characteristics of traditional Bulgarian foods
I. Alexieva, M. Baeva, I. Milkova

90. Street food in the Black Sea regions of Ukraine
S. N. Fedosov, L. V. Kaprelyants, K. S. Fedosova

91. Street food in Georgia
M. Jorjadze, E. Shatberashvili, I. Ebralidze, Z. Kilasonia

92. Traditional food of Georgia
M. Jorjadze, E. Shatberashvili, I. Ebralidze, Z. Kilasonia

93. Traditional food in the Black Sea regions of Ukraine
G. Khomich, L. Kaprelyants, S. Fedosov, K. Fedosova

94. Potential western-Ukrainian traditional street foods
L. Buhyna, M. Mudryk, O. Levchuk, L. F. D’Antuono, N. Boyko

95. Potential western-Ukrainian traditional street foods
L. Buhyna, M. Mudryk, O. Levchuk, L. F. D’Antuono, N. Boyko

96. Street food in Russian Federation
D. V. Karpenko