COST863 Workshop on

‘DEFINING NEEDS OF BERRY INDUSTRIES’

Programme
and
Book
of
Abstracts

20th and 21st March 2009

Odemira – Portugal

COST863 Management Committee Meeting

INRB-I.P. / L-INIA, Oeiras

Programme
and
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Abstracts

19th March 2009

Oeiras – Portugal

COST863 Management Committee Meeting

Oeiras – Portugal

INRB-I.P. / L-INIA, Oeiras

19th March 2009

Organised by:

Pedro Oliveira, INRB-I.P., Oeiras, PT	General Organizer
Margaret Korbin, INSAD Skiernevice, PL	EBA organizer
Bruno Mezzetti, UNIVPM-SAPROV, Ancona, IT	COST863 Chairman
Claudia Santos, ITQB, Oeiras, PT	Oeiras meeting
Luís Lopes da Fonseca, INRB-I.P., Oeiras, PT	Odemira meeting
Marta Baptista, Driscoll´s of Europe, S. Teotónio, PT	Industry – technical visit
Francisco Barreto, INRB-I.P., Oeiras, PT	Secretariat

COST863 Management Committee Meeting

PROGRAMME

Thursday, March 19th

8.30 h	**Hotel transfer (Bus departure from Praia-Mar Hotel)**
9:00 h	**Reception at L-INIA, Oeiras**
9:15 h	1. Welcome to participants 2. Adoption of agenda 3. Minute of last MC meeting 4. Progress report of working groups WG Leaders – Meetings organisers. 5. STSMs Report status, applications (R. Nesby) 6. EBA organization and update on EU berry production data (M. Korbin) 7. Publications, annual report 8. Year Budget planning (updates form A. Maggio, Scientific officer) 9. Evaluations (J.F. Hausman, Action Rapporteur) 10. Euroberry Action in the IHC 2010 (António Monteiro and Pedro Oliveira) – Defining the program of the Berry Symposium 11. Long-term planning (WGs meeting and Workshops, STSMs) 12. We are coming to the end of COST863, do we need another COST action on berry 13. Time and place of next meeting 14. AOB
12.30 h	**Lunch**
14.30 h	**<u>Berries in EU Research</u>** **Henrique Guedes-Pinto**, Food and Agriculture COST National Delegate. Depto. Genética e Biotecnologia, Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal
14.45 h	**Maria João Fernandes**, Overview of Food, Agriculture and Biotechnology in FP7. FP7 National Contact Point 'Health'; 'Food, Agriculture and Fisheries and Biotechnology', GPPQ – Gabinete de Promoção do 7º Programa-Quadro de IDT / FP7 Promotion Office, Lisboa, Portugal

15.05 h	**Malgorzata Korbin**, EU Berry Production in 2008 - Background for EBA. Research Institute of Pomology and Floriculture, Poland
15.25 h	**Discussion**
16.00 h	**Coffee Break**
	STSM Reports (Rolf Nestby)
16.20 h	**Lucélia Tavares**, Phytochemical Profiling of Different Tissues from Portuguese Endemic *Rubus* Species. Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal
16.50 h	**Daniel James Sargent**, PCR-Based Characterisation of a BAC Library from the *Fragaria Vesca* (Rosaceae) Cultivar 'Ali-Baba' and Genome-Wide Anchoring of BAC Clones to the Diploid *Fragaria* Reference Map. East Malling Research, New Road, East Malling, Kent ME19 6BJ, UK
17.20 h	**Emília Ondrušková,** Biotechnology of *Vaccinium* Species for the Conservation and Utilization of Valuable Genetic Resources. Institute of Plant Genetic and Biotechnology, Slovak Academy of Science, Nitra, Slovak Republic
18.00 h	**Departure to Odemira (Brief stop for dinner)**
21.30 h	**Arrival to Odemira**
22.00 h	**Welcome drink at Hotel Social, Vila Nova de Milfontes**

Overview of Food, Agriculture and Biotechnology in FP7

Fernandes, M.J.; Camilo, J

FP7 National Contact Point 'Health'; 'Food, Agriculture and Fisheries and Biotechnology', GPPQ – Gabinete de Promoção do 7º Programa-Quadro de IDT / FP7 Promotion Office, Lisboa, Portugal

Keywords: *FP7, KBBE, preparation of Work Programme, research in food and agriculture*

The primary aim of theme "Food, Agriculture and Fisheries, and Biotechnology" (or KBBE) under the Seventh Framework Programme for Research and Technological Development (FP7) is to establish a European Knowledge-Based Bio-Economy (KBBE) through the promotion of innovative knowledge and competitiveness in Europe, the improvement of the quality of life of the European citizens and the protection of the environment and social model. This theme is built around three major activities: (1) Sustainable production and management of biological resources from land, forest and aquatic environments, (2) Fork to farm: Food (including seafood), health and well-being and (3) Life sciences, biotechnology and biochemistry for sustainable non-food products and processes. The overall budget of this theme is 1.9 b€ till 2013.

Like all themes of the Cooperation Specific Programme (SP), the KBBE theme is defined at a relatively high level in the SP, adopted in December 2006, and a series of research topics are identified as priority subjects for European Union (EU) support in the annual work programmes (WP). Hence, the annual WP provide additional detail of the implementation of the SP, setting out information on the priorities, objectives and policy relevance of the research topics which will be implemented through calls for proposals launched in an annual basis. The most important source for consultation on the strategy adopted in the preparation of the annual WPs is the Advisory Groups settled up by the European Commission (EC) for the different themes of the Cooperation SP. However, a number of other sources are used by the EC in its external consultation for the identification and definition of topics, in particular outputs from current/previous EU projects (including ERA-NET and COST Actions), EU consulting bodies [e.g. Standing Committee on Agricultural Research (SCAR), European Food Safety Authority (EFSA)], international organisations and expert groups, workshops, conferences and other events with the participation of relevant stakeholders. In the case of subjects of strong industrial nature and relevance, the work of the different 'European Technology Platforms' established in various fields also have a major influence on the definition of the WPs. On the other hand, almost any stakeholder can contribute/provide inputs to the annual WP prepared by the EC, bearing in mind that the most important thing is that the right and relevant input with European added value is communicated through the most appropriate channel and is received by the EC at the appropriate time of the WP annual cycle. In addition, the Research Directorate General (DG RTD), which manages the research budget of the EC, will also have to take into account the opinion of the different policy DGs related to this theme, in particular DG Environment (ENV), DG Health & Consumer Protection (SANCO), DG Agriculture (AGRI), DG Maritime Affairs & Fisheries (MARE), EuropeAid Cooperation Office (AIDCO) and DG Development (DEV) in order to have their research needs reflected on the annual WP. Finally, the Programme Committee, where all EU Member States and Associated Countries are represented by their respective national delegations, closely follows the process of WP preparation and represents the country in terms of ensuring their interests are fully considered.

Once the WP is published, consortia will normally have a period of 3-5 months till the call submission deadline to prepare their own proposals and, as a general rule in this theme, only one proposal per topic will be funded.

The main objective of this presentation is to give an overview on how FP7 WPs are prepared, in particular the main factors involved in the definition of topics for the KBBE theme. Some general recommendations for proposers and organisations considering participation in future calls will be provided taken into account the experiences of the previous KBBE calls in 2007 and 2008.

STSM Report

Phytochemical Profiling of Different Tissues from Portuguese Endemic *Rubus* Species

L. Tavares[1], C. Santos[1], G. J. McDougall[2], S. Fortalezas[1], D. Carrilho[1], D. Stewart[2] and R. B. Ferreira[1,3]

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[2]Plant Products and Food Quality Programme, Scottish Crop Research Institute, Dundee, DD2 5DA, Scotland, UK;
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Keywords: *Wild blackberries, Rubus sp., polyphenols, antioxidant activity, HPLC-MS*

Blackberries are a well known source of polyphenols with high antioxidant activity that may provide human health benefits. *Rubus* is a genera with high diversity and globally distributed [1]. In the Northeast of Portugal there are some endemic species of *Rubus* (wild blackberries) not yet chemically characterized. The aim of this study was to determine the antioxidant potential of Portuguese *Rubus* endemic species and to evaluate their use as a source of phenolic compounds with high antioxidant activity.

For fruits and leaves of three *Rubus* species (*R. brigantinus, R. genevieri and R. vigoi*) and a commercial blackberry cv. Apache (*Rubus rubus*) it was determined the polyphenol content (Singleton and Rossi, 1965), anthocyanin content [1] and antioxidant activity [2]. It was determined the HPLC-DAD-ESI-MS profile for each species in order to identify the differences between them.

In case of fruits, although two endemic species (*R. brigantinus* and *R. vigoi*) have higher amount of total polyphenols than commercial blackberry cultivar, their antioxidant activity and anthocyanin content are similar to the commercial species. *R. genevieri* reveal to have the lowest values for all parameters evaluated. Comparing the HPLC profiles, the endemic species contain a higher amount of ellagitannins. The ellagitannins are referred as in some *in vitro* studies possessing anti-proliferative activity [3] and vasodilatory properties [4]. In the case of *R. vigoi* it has also a higher amount of quercetin derivatives that are described in bibliography as presenting some important properties such as anti-inflamatory [5], anti-coagulative [6], anti-proliferative [5], anti-bacterial [7], and anti-hypertensive [8] among others. For leaves, *R. genevieri* and *R.vigoi* presented the higher values of total polyphenols and antioxidant activity. The HPLC profiles recorded at 280 nm for all species are quite similar. However, R. vigoi presented, as in fruits, higher amounts of quercetin derivatives. The use of species with higher contents in ellagitanins and quercetin derivatives such as the Portuguese endemic Rubus could be promising in the achievement of healthier fruits for direct consumption or to be added in nutraceutical formulations.

1. Deighton N, et al. (2000). Journal of the Science of Food and Agriculture 80: 1307-13
2. Cao G, et al. (1993). Free Radic. Biol. Med. 14: 303-11
3. Ross HA, et al. (2007). Phytochemistry 68: 218-28
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5. Orsolic N, et al. (2004). J Ethnopharmacol 94: 307-15
6. Bucki R, et al. (2003). J Thromb Haemost 1: 1820-8
7. Cushnie TP, et al. (2005). Int J Antimicrob Agents 26: 343-56
8. Perez-Vizcaino F, et al. (2006). Biochem Biophys Res Commun 346: 919-25

STSM Report

PCR-Based Characterisation of a BAC Library from the *Fragaria Vesca* (Rosaceae) Cultivar 'Ali-Baba' and Genome-Wide Anchoring of BAC Clones to the Diploid *Fragaria* Reference Map

D. J. Sargent[1], J. Bonet[2], A. Monfort[2], M. C. Muñoz-Torres[3], J. Ribes[2], A. G. Abbott[3], P. Arús[2], D. W. Simpson[1], J. Davik[4]

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[2]Institut de Recerca i Tecnologia Agroalimentáries (IRTA), Departament de Genética Vegetal, Carretera de Cabrils s/n, 08348 Cabrils (Barcelona), Spain.
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Keywords:

A diploid strawberry bacterial artificial chromosome (BAC) library, consisting of 18,432 clones with an average insert size of 98 kb, was constructed from the diploid *F. vesca* f. *semperflorens* accession 'Ali Baba'. As the genome size estimate for *F. vesca* is approximately 206 Mb per haploid genome, the library represents over 8× coverage of the *Fragaria* genome. BAC DNA from individual library clones was pooled to create a PCR-based screening assay for the library, whereby the entire library could be screened by performing just 28 PCR reactions. These pools were used to identify a set of BAC clones containing 60 molecular markers that had previously been mapped to loci across the seven linkage groups of the diploid *Fragaria* FV×FN reference map. The number of positive colonies that could identified for each marker suggested that the library represents between 4× and 12× coverage of the diploid *Fragaria* genome, depending on the location of the marker on the FV×FN reference map, which is in accordance with the estimate of library coverage based on average insert size. This BAC library will be used as the basis of the construction of a physical map for *F. vesca* and the superpools will permit physical anchoring of molecular markers using PCR.

STSM Report

Biotechnology of *Vaccinium Species* for the Conservation and Utilization of Valuable Genetic Resources

E. Ondrušková[1] and M. Laimer[2]

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[2]Plant Biotechnology Unit, IAM, Department of Biotechnology, BOKU, Vienna, Austria

Keywords: *Shoot proliferation, micropropagation, adventitious organogenesis, transformation*

Lingonberry (*Vaccinium vitis-idaea* L.) and blueberry (*Vaccinium corymbosum* L.) are commercially important fruit crop species with specific taste of berries. They are used as medicinal plants, due to their high anthocyanin content and are an excellent source of antioxidants. Berries and leaves have various health effects and are used as a disinfectants, to lower cholesterol levels and as a treatment for rheumatic diseases.

In vitro techniques as micropropagation and adventitious shoot regeneration via organogenesis or somatic embryogenesis are increasingly being used as alternative ways of breeding and for the production of large numbers of plants on a commercial scale. *Vaccinium* ssp. have been propagated from nodal or shoots-tip explants or via adventitous organogenesis (Cao, Hammerschlag, 2000, Jaakola et al. 2001, Debnath 2003, 2005, Meiners, 2006).

Young shoots of glasshouse grown donor plants were used as primary plant material for establishment of an *in vitro* genebank of *Vaccinium sp.* In total 333 explants of different cultivars were established, yielding actively developing shoots in the range from 68% to 93,7%, depending on the cultivar.

The influence of different media, various concentrations of cytokinin and new cultivation conditions was tested to determine their effect on the ability for multiple shoot proliferation and propagation and for direct and indirect adventitious regeneration in different cultivars. On media supplemented with zeatin, cultivars produced higher, vital shoots with stronger stems and larger leaves compared to media supplemented with 2iP riboside. Cultivars of *V.corymbosum* L. showed direct and indirect shoot regeneration on .

Isolated shoots were subjected to *in vitro* rooting on WPM medium supplemented with combination of auxins and cytokinins, followed media with auxins and *in vitro* rooting in liquid media.

Leaf discs of *in vitro* grown *Vaccinium cylindraceum* lines and a few *Vaccinium corymbosum* cultivars were used for transformation by *Agrobacterium tumefaciens* strains LBA EHA 105 and LBA 4404, carrying marker genes. All explants of selected cultivars after transformation were vital and produced callus within 6-8 weeks after transformation. Selection of transformed explants on media supplemented with kanamycin should lead to the regeneration of transformed shoots.

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Marta Baptista, Driscoll´s of Europe, S. Teotónio, PT	Industry – technical visit
Francisco Barreto, INRB-I.P., Oeiras, PT	Secretariat

COST863 Workshop

'Defining needs for the berry industry'

PROGRAMME

Friday, March 20th

8.30 h	**Reception at Auditorium of Caixa de Crédito Agrícola de S. Teotónio, Odemira**
9.00 h	**Opening Session**
9.30 h	**Session I - Presenting the COST863 Euroberry Network** **Bruno Mezzetti** - What is COST863 **Philippe Chartier** - Genetic Resources, Breeding and Biotech **Audrius Sasnauskas** - Variety Network **Paivi Parikka** - Pest and Diseases **Pedro B. Oliveira** - Cultivation Systems **Erika Kruger** – Climate Change **Margit Laimer da Camara Machado** – Bioactive Compounds
10.45 h	**Coffee Break**
	Session II - World Perspective
11.00 h	**Fumiomi Takeda,** North American Berry Industries and Research Areas. USDA-ARS Agricultural Research Service, Apalachian Fruit Research Station, Kearneysville, USA
11.30 h	**Jill Stanley,** The New Zealand Berry Industry and Main Research Areas. The New Zealand Institute for Plant and Food Research Limited, New Zealand
12.00 h	**Magnus Engstedt,** Berry Industry in Nordic-Scandinavian Countries. County Board of Agriculture, Sweden
12.30 h	**Bozena Nosecka**, Berry Industry in Poland. Institute of Agricultural and Food Economics, Poland
13.00 h	**Lunch (Tasting of different strawberry cultivars)**

14.30 h	**Marta Baptista,** A Contribution for Research Needs on European Grown Berries. Driscoll´s of Europe, Portugal
15.00 h	**Sezai Ercisli,** Berry Industry in Turkey. Ataturk University, Turkey
	Session III - Plant Material
15.20 h	**Josef Špak,** Research on Viruses and Phytoplasma Infecting EU Berries – Advances, Challenges and Threats. Biology Centre, Institute of Plant Molecular Biology, Academy of Sciences of the Czech Republic
15.40 h	**Mathieu Billotte,** What Challenges Lie Ahead for the Blueberry Varieties of the Future? Multibaies, France
16.00 h	**Danilo Bernardini,** New Fruits Breeding Programme Developing in Europe. Newfruit Cesena, Italy
16.20 h	**Coffee Break**
	Session IV - Others
16.40 h	**Snjezana Sredojevic,** How to Use Scientific Proves to Create a Retail Brand Name in Frozen Fruit Bussines - Example 'First Fruit', SERBIA. Frigogrand, Serbia
17.00 h	**Bo Ahlstedt,** Olle Svensson AB as Part of Nordic Food Group. Olle Svensson Company, Sweden
17.20 h	**Nicola Fuzzati,** *Vaccinium myrtillus*: Features of an Industrial Medicinal Plant. Indena, Milan, Italy
17.40 h	**Annalisa Bacchi,** Barilla Company and Interest on Berry Fruit. Barilla Company, Parma, Italy
18.00 h	**Discussion**
19.00 h	**End of works**
20.30 h	**Farewell Dinner (Hotel Social, Vila Nova de Milfontes)**

Saturday, March 21st

8.30 h	**Technical Visit** **Wellpict Portugal** – Early strawberry production under protected cultivation (cultivar Candonga – Sabrosa) **BerryPort** – Strawberry, Raspberry and Blackberry production under protected cultivation
12.30 h	**Departure to Lisbon**
17.30 h	**Lisbon expected time to arrival**

COST 863 - Euroberry Research: from Genomics to Sustainable Production, Quality and Health
WG1: from Genome to Berry Fruit

Beatrice Denoyes Rothan[1], David Simpson[2], Mihail Coman[3], Audrius Sasnauskas[4] and Bruno Mezzetti[5]

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Keywords:

An integrated approach is required in the application of genetic and genomic technologies. In addition, the use of recombinant DNA technology will be an important tool for studies on functional genomics. The aim of the WG1 of the COST863 is the integration of the following four approaches:

1. Genomics and molecular methods in berry: Methods have been developed on various small fruit species such as genetic maps and comparative mapping, identifying QTLs (Quantitative Trait Loci) controlling traits involved in agronomical or fruit traits, Reverse genetic approaches aiming at identifying candidate genes and at analyzing their function in planta (transcriptome approaches), and efficient stable transformation. In addition, high throughput technologies for plant genotyping, such as those currently developed for the detection of Single Nucleotide Polymorphism (SNP), will accelerate the fine mapping of QTLs and ultimately the positional cloning. These tools will further benefit to breeding using molecular markers beside the classical breeding.

2. Breeding and selection: The main objectives will be the definition of common methods for desired trait selection and exchange of data as inheritance of important traits.

3. Genetic resources: The main objective of this part is to list all genetic resources of small berry available in Europe. In addition, networking on European genetic resources will allow rationalisation of the European collection and the adoption of harmonized procedures and techniques. This topic will be supported by two EEC projects of GenRes, GenBerry and Ribesco (http://ec.europa.eu/agriculture/funding/index2_en.htm).

4. Variety evaluation: Strawberry Variety Network is established and will allow investigate the influence of geographic and climatic conditions on plant performance, fruit quality and disease resistance. In addition, a definition of a common protocol for notation (descriptors and data to be recorded) for cane and bush fruits will be developed.

COST 863 – Euroberry Research: from Genomics to Sustainable Production, Quality and Health
WG2: Quality Assurance of Planting Material

Bert van Duijn[1], Paivi Parika[2], Gina Ruzic[3]

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Keywords:

The basis for the sustainable production of high quality berries is the provision of planting material of high quality and purity. The variability of the various national standards appeared to be insufficient to solve the problems emerging on an international market. There is a need for scientific co-operation in the field of berry plant propagation techniques, quality control and certification.

Aim of the group is the proper integration of the following different approaches:

- *Plant health and diagnostics*
- *Plant Propagation*
- *Nursery Plant management and physiological quality*

Receiving diseased plants forces growers to use more and more pesticides and in consequence the risk of pesticide residues on the fruits is increased. Production of healthy plant material is strategically important in controlling many pathogens.

Expanding European berry production to different cultivation conditions and culture techniques is strictly related to the availability of a nursery production of plants with the proper quality for sustaining an efficient production.

References:

http://www.euroberry.it

COST 863 – Euroberry Research: from Genomics to Sustainable Production, Quality and Health
WG3: Sustainable Berry Production

Monique Bodson[1], Pedro Bras de Oliveira[2], Gijs van Kruistum[3] and Eamonn Kehoe[4]

[1]Gembloux Agricultural University, Laboratory of applied plant physiology and horticulture, Belgium
[2]INRB, I.P. / L-INIA, Oeiras, Portugal
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[4]Teagasc Soft Fruit, Enniscorthy, Ireland

Keywords:

The sustainability concept integrates both economic and environmental dimensions in a single approach. The different aspects of the production systems for the main berries are considered.

Strawberry and raspberry productions are the principal focus, but minor berries are also dealt with. The main scientific and technology challenges are related to the management of the crop performance in relation to the market and consumer requirement.

These challenges are dealt with on the basis of 3 main intersected experimental approaches:

- factors affecting berry plant yield components : physiological approach
- factors and tools for improving efficiency in plant productivity and fruit quality: production systems and soil/root condition management
- pest and disease management as related to the production systems: from diagnostics to controls.

A main focus for the cooperating action is to detect the strength and weakness of the production systems at the EU level and emphasizes research areas where new or additional knowledge or adequate tools are needed for efficient berry productions, in accordance with the market requirements and the consumer preoccupations.

References:

http://www.euroberry.it

COST 863 – Euroberry Research: from Genomics to Sustainable Production, Quality and Health WG4: Bioactive Compounds of Berry Fruit Affecting Human Health

M. Laimer[1], G. Marzban[2], A. Herndl[2], J. Beekwilder[2], G. McDougall[3], D. Stewart[3], J. L. Quiles[4], E. Krüger[5], C. Atkinson[6], R. Nestby[7], T. B. Toldam-Andersen[8], E. Harsan[9], M. Heinonen[10], M.Olsson[11], Z. Juranic[12], M. Battino[13] and B. Mezzetti[14]

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[11]Dept. of Crop Science, Swedish University of Agricultural Sciences, Alnarp, S;
[12]Institute for Oncology and Radiology of Serbia, Belgrade, Serbia and Montenegro;
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Keywords:

The EUROBERRY Action has a new and advanced approach to promote the integration of berry research, production systems, quality control, added nutritional value and consumer acceptance. It focuses on strawberry, raspberry, blueberry, red and black currants and blueberry as potential sources of unusual polyphenols and biological activities.

WG 4 (coordinated by M. Laimer, IAM, BOKU, Vienna) is interested in three major themes:

1. Development and standardisation of technologies to determine the modes of action of berry derived phytochemicals, smart screens for berry crops in relation to nutritional relevance. The aim is to adapt the use of large scale functional genomics and standardised technologies to determine the modes of action of berry derived phytochemicals in relation to health relevant aspects.

2. Polyphenols in berries: phytochemical profiling and the relation to quality in human health. A systematic evaluation of antioxidant features (i.e., total antioxidant capacity, total polyphenol contents, total anthocyanin contents) on different small fruit cultivars together with the typical parameters usually included in breeding programmes aiming to obtain improved berry patterns and contents.

3. Factors affecting bioactive compounds in berry fruits and their derivates. Genetic resources collections are potentially valuable for screening genetic variation of nutritional important compounds. Experimental activities in Denmark, England, Germany, Italy and Norway, are underway examining the natural climatic impact on fruit quality as well as cultivation technique and crop manipulation affecting or interacting with climatic impact, on cultivars of several small- and top- fruit species.

Data obtained will be influential in collaboration with other WGs of COST 863 to determine breeding strategies for bioactive compounds and antioxidant capacity in berries to enhance the nutritional quality of berry fruits.

References:

http://www.euroberry.it

North American Berry Industries and Research Areas

Fumiomi Takeda

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Keywords:

The farm gate value of small fruit crops in North America has increased significantly in the last 10 years. Much of this increase is due to increased consumption for their reported health benefits. Small fruits are rich in antioxidants which have been linked to fighting aging, cancer, and heart diseases. The latest agricultural statistics (2007) reported 120,000 ha are in berry crops (blackberry, blueberry, cranberry, currants, red raspberry, and strawberry), valued at $3.23 billion which is 20% of total farm gate value for noncitrus fruit and nut crops produced in the United States. The four leading berry crops are strawberries, blueberries, cranberries, and red raspberries with farm gate value of $1.89 billion, $0.54 billion, $0.44 billion, and $0.28 billion, respectively.

Currently, 80% of the acreage (25,000 ha in 2008) in strawberries are in California and Florida. These two states produce 93% of strawberries sold through fresh market channels. The total annual domestic consumption and exports now total nearly 900,000 metric tons. The processed strawberry industry (more than 90% in California) has farm gate value of $0.16 billion. There are now 27,350 ha planted in highbush blueberries. Major production states are Michigan (8,500 ha), Georgia (4,300 ha), and New Jersey (3,400 ha). In addition, more tore than 1,500 ha of blueberries are cultivated in each of the following states: North Carolina, Florida, Oregon, Mississippi, and Washington. Nationally, the blueberry acreage has expanded to 27,500 ha, up 3,000 ha from just 3 years ago. The expansion has occurred rapidly in Florida and Georgia (Southeast), California, and Oregon and Washington (Pacific Northwest). In 2008, cranberry generated $444 million in farm gate value, up $16 million from 2006. Currently there are 17,000 ha of cranberries and production reached 346,000 MT in 2008. The major producing states are Wisconsin and Massachusetts, with more than 80% of domestic production, followed by New Jersey, Oregon, and Washington. Frozen and processed red raspberries are grown mainly in Oregon and Washington (5,000 ha) and generate $0.10 billion in farm gate value.. Red raspberries for fresh market are produced on 1,500 ha in California and generate about $0.20 billion annually in farm gate value.

Small fruit production statistics for Canada are presented in Table 1. Major production areas are in several of the eastern provinces and in British Columbia. Blueberry is the leading small fruit crop in Canada (lowbush type in the Maritime Provinces and highbush type in Quebec, Ontario, and British Columbia) and blueberry acreage continues to increase. Although the acreage statistics for each province are not available, cranberry acreage has increased by more than 50% in the last 7 years. From 2007 to 2008, strawberry and raspberry acreage decreased in all production areas.

Official acreage or value statistics for berry production in Mexico are not available. The two major strawberry production areas for strawberries, raspberries, and blackberries are in the highland states of Michoacan and Jalisco in central Mexico and in northern state of Baja California along the Pacific coast. According to data compiled by the USDA Agricultural Marketing Service which is available on the USDA Fruit and Vegetable Market News website (www.marketnews.usda.gov/porta/fv), fresh market imports of strawberry, blueberry, raspberry, and blackberry have increased dramatically since 2003. Strawberry imports from Mexico now account for 6% of the total consumed in the United States. Most of the increase is from shipments during November through February. The combination of cultivars developed in California and new production techniques has greatly increased the volume of fresh market fruit produced per hectare during the winter months in Mexico.

In the United States, research on small fruit crops (breeding/genetics, applied and basic biology, and health/nutrition) are conducted at nine Agricultural Research Service (ARS) laboratories located across the country and at many of the land-grant universities. The

following states have at least five professorial-rank personnel assigned to small fruit crops (California, Oregon, Washington, Michigan, Florida, North Carolina, New York, and Ohio). There are also private companies (Ocean Spray, Driscoll Strawberry Associates, Plant Sciences, Inc. and its subsidiary Berry Genetics, and California Giant, Inc., Kanaka Peak Research, and Five Aces LLC) conducting small fruit R&D work, mainly for cultivar development or market development. ARS conducts research to develop and transfer solutions to agricultural problems of high national priority. ARS scientists conduct research on appropriated funds. In addition, they seek extramural funds along with university investigators from competitive federal grant programs [USDA National Research Initiative ($181 million), Specialty Crop Research Initiative ($47 million) , Small Business Innovation Research (38 million), Regional Sustainable Agriculture Research and Education ($1 billion), and Organic Agriculture Research and Education Initiative ($17 million)] and state and regional commodity groups (Pacific Northwest Small Fruit Research, California Strawberry Commission, North American Blueberry Council, North American Strawberry Growers Association, and North American Raspberry and Blackberry Association, Michigan Blueberry Growers Association,).

Small fruit crops along with vegetables, fruits and nuts, and nursery/floriculture crops are defined as specialty crops in the U.S. This has improved extramural funding opportunities for small fruit researchers. Several new federal competitive programs (www.csrees.usda.gov/fo/funding.cfm) are intended to promote collaboration, open communication, the exchange of information, and the development of resources that accelerate application of scientific discovery and technology to solving needs of the various specialty crop industries. Proposals for these programs are multistate, multi-institutional, or trans-disciplinary, and include mechanisms to communicate results to producers and the public (food consumers). An example of such a project is: "Advancing blueberry production efficiency by enabling mechanical harvest, improving fruit quality and safety, and managing emerging diseases". This project was funded for $1.7 million and has 11 investigators from 5 states, representing six different disciplines in physical, biological, and social sciences. This project recognized that within the next 5 years, the southeastern United States is projected to become the largest blueberry-producing area in the nation. Growth in acreage and production has been especially impressive for the early-maturing southern highbush blueberries, which ripen during a favorable market window and provide an important source of income for small and medium-sized farms and a lifeline for the surrounding rural communities. However, in the face of increasing domestic supply and demand, rapidly strengthening international competition, increased pressure on producer prices, and looming shortages in labor, blueberry growers will have to elevate their overall production efficiency considerably to remain profitable and sustainable. The long-term goal of this project is to enable an unprecedented leap in efficiency through a comprehensive, interdisciplinary research and extension effort. Another small fruit project titled "Generating genomic tools for blueberry improvement" was funded for $1.0 million. The overall goal of this project is to develop and make available genomic tools for the improvement of blueberry. Three ARS locations and three university locations (University of Maine, Michigan State University, and Towson University in Maryland) are involved. The team's objectives are deeper sequencing of the blueberry transcriptome; use the newly generated ESTs to develop molecular markers for blueberry; use the markers in specific, well-defined mapping and genetic relationship studies of blueberry; and deliver research results and training in molecular breeding to the industry, breeders, and students through a multifaceted outreach program.

California Strawberry Commission (CSC) is the largest commodity-source funds for small fruit research. About $1.0 million is allocated annually to production research projects in breeding, disease and pest management, food safety, and methylbromide alternatives. In addition, CSC allocates about $0.3 million for health and nutrition research. The Pacific Northwest Center for Small Fruit Research and various berry commissions in the region allocate $1.0 million annually to proposals that enhances profitability and sustainability of the small fruit industry in the Pacific Northwest through research in genetics, pest management, berry processing, production and physiology. The United States Highbush Blueberry Council is a national promotion and research organization and allocates $0.5 million bi-annually to proposals focused on health benefits derived from blueberry consumption. Currently, most granting agencies require that proposals demonstrate that the cost of research is leveraged,

in part or completely, with other funding sources through cooperation. Eligibility for some federal, state and commodity grant programs now must have stakeholder input.

Table 1. Estimate of commercial small fruit production area and farm gate value in Canada in 2002, 2006, and 2008, and leading provinces. Source: Statistics Canada, Fruit and Vegetable Production (Catalogue no. 22-003-X, vol. 77, no.1).

	Cultivated Area (ha)			Farm Gate Value ($1,000)		
Crop	2002	2006	2008[1]	2002	2006	Major Provinces
Blueberry	50,000 (50%)[2]	60,000 (52%)	62,253	86,415	225,741	QUE, NS, NB, BC
Cranberry	3,057 (85%)	4,120 (92%)	4,806	38,625	79,770	BC, QUE[3]
Raspberry	3,796 (90%)	3,225 (90%)	2,647	29,930	23,941	BC, QUE, ON
Strawberry	5,793 (81%)	4,874 (79%)	4,486	52,396	60,782	QUE, ON, BC, NS

[1]Estimated

[2]Percent bearing acreage.

[3]Data suppressed to meet the confidentiality requirements of the Statistics Act.

The New Zealand Berry Industry and Main Research Areas

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Keywords: *New Zealand berry industry, research needs, new cultivar development, health benefits*

The New Zealand Berry industry achieves approximately $NZ70M (28M€) in fresh sales and $NZ27M (11M€) in processed fruit sales, with approximately 50% of this representing export sales. Blueberries account for about half of the fresh fruit sales. Strawberries follow second, although the majority are sold domestically. Blackcurrants account for about two thirds of the processed fruit sales, followed by Boysenberry. Blackberries and raspberries are small industries in New Zealand, and cranberries are a new but emerging crop.

The berry industries are organised under product groups: Blueberries New Zealand, Blackcurrants New Zealand, New Zealand Boysenberry Council and Strawberry Growers New Zealand. Boysenberries and blackcurrants operate under the New Zealand Horticulture Export Authority, under which legislation is developed to provide industry standards for exported fruit.

Research needs can be divided into three main categories. The first is production needs, which vary among berry types, but include issues such as pest and disease control, improved fruit quality, plant nutrition, reduced production costs, impacts of climate change and development of replacement chemicals. The second category of research needs relates to consumers and market requirements and includes areas such as gaining improved health benefits, accurate traceability and reducing the carbon footprint. The final category is the development of new cultivars of blueberry, *Rubus* species types (raspberry, Boysenberry & hybrid blackberry) and blackcurrants. Whilst breeding objectives vary for each crop, there is an overall focus on increasing crop production, improving fruit flavour and quality, and breeding for high anti-oxidant types.

The New Zealand berry industry cannot compete on price against counties with low-cost production. In order to ensure successful expansion into the future, research must be focused on areas where New Zealand berries can be differentiated from those produced in other countries.

Berry industry in Nordic-Scandinavian Countries

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Keywords:

The production of soft fruit for the fresh market is undergoing a big change because of many reasons: reduction in available pesticides, demand for residue-free fruit, healthy image, changes in cultivation e.g. tunnelling and season extension, new club cultivars but also resistance-breaking strains of pests and diseases. We will see an increasing demand of soft fruit for the future.

Different standards in conventional production

It´s only 20 years ago Integrated Production was introduced on the growers initiative. However, the growers were not very easy to convince since the production went more expensive. It was more a way to get access to the market the growers were told. After some 15 years this is now the fact!

The market itself has worked out a set of rules, Eurepgap, with similar goals. When IP production is more focused on the environment, Eurepgap is more focused on food security. In Scandinavia we don´t have a very concentrated market with only a few big players like in UK. The distribution is much more diversified. We stick to the IP-framework and try to convince the market we are putting a hard pressure on sustainable production. Many growers are still complaining because of all documentation and production that is required. Still they are lucky compared to the growers in UK where the big market chains has put a hard pressure on the producers in order to impress on the consumers. They all have their own environmental profile. They seem to overbid each other.

Organic Production

Often the growers are blaimed for not producing organic soft fruit. The truth is that it is the comsumers choice. If the consumers are willing to pay the extra cost, the organic production will rise automatically. Today when the volumes are low the market does not make enough money. There is organic production in all countries but it is generally on a very small scale. A general opinion in Europe is that organic production in soft fruit will remain a niche market in most regions.

Obviously, the big environmental progress will be achieved by the conventional growers who step by step are changing in direction to organic farming. In Strawberry for example the Swedish conventional growers have adopted quite a big use of physiologically active agents against P&D, biological control, damage threshholds, monitoring and control systems and decision support systems. The companies selling predators are selling most of their products to the conventional growers.

Reduction of available pesticides

Off-label registration will be very important for the future. The situation for Strawberry is difficult as for many other minor crops. In Sweden growers associations and authorities has until now not realized, there is a need for cooperation and a strong acting to get access to pesticides in minor crops. There should also be a better understanding by the registration authorities. Despite EU:s ambition to harmonize the use of pesticides we still have a long way to go. Only in Scandinavia we have quite different lists of registered products and conditions how to use the chemicals. This is a bit of a mystery.

The last couple of years the Swedish growers have been lucky getting registered several products against Botrytis and Powdery Mildew. Vertimec is also allowed even before harvest as well as Pirimor is. However the tarnished plant bug (Lygus) is quite big problem since Dipterex (triklorfon) and Gusathion (azinfosmetyl) is being faced out. Unfortunately many growers spray several times with Pyrethroids, which is increasing the number of spider mites. Since imports of plants is increasing we have an increasing problem with soilborne diseases. Since analyses are expensive, too many growers are spraying without knowing which fungus is causing their problems.

Production patterns

The growers tend to extend their production in order to be more attractive to the market. The market is much more interested in one grower´s products, when he can supply products during a longer period.

Also in Scandinavia Strawberry is produced from April until November. This out of season production takes place in heated greenhouses, tunnels, and tabletops by using frigoplants normally planted in July.

If you plant big frigoplants of Strawberry in springtime you can harvest 60 days after planting. When planting is made throughout the season you can achieve a continuous yield from one single variety. You are getting two yields within 15 months and then you can pull out the plants. This gives you a totally different situation regarding P&D besides a very high percentage of 1st class fruit.

In Belgium a similar system has been developed for Raspberry.

The interest for soft fruit in tunnels is increasing. The quality in tunnels is superior, the yield is better, you are not depending on the weather conditions, the crop is earlier and the need of pesticides is lower.

Also the Raspberry production has moved under tunnels in a small scale. Raspberry respond even better to tunnels giving the growers a bigger increase in yield and better quality compared to Strawberry.

Everbearers in Strawberry like Flamenco and Everest is not very popular in Scandinavia mainly because of grey mould. Introducing tunnels could be the driver for a change, making it possible for Scandinavian growers to produce everbearers as well as primocanes in Raspberry in the future thanks to a much lower Grey Mould problem.

Closer to the consumer

There is a trend getting closer to the consumer. Instead of shipping the products far away, consumers tend to appreciate production of soft fruit from next door. Promotion is getting more important. Everytime you are selling something you should pass on some written information how the production is taking place. This really give your products some added value.

The situation for soft fruit consumed by the industry

Many big players representing the industry claim that everybody now is looking at Super fruits that is rich in vitamins, flavanoids, anthocyanins, phenolic acids and antioxidants like Blueberry, Cranberry and Black Currant. Glaxo Smithkline (GSK) has a worldwide turnover in Ribena juice made of Black currant well over 3 billion Skr.

They have introduced a Blueberry Ribena and the price for concentrated Blueberry has doubled in some years. In a couple of years the market can be flooded with Blueberry like the situation is periodically for the Black Currant. This crop is facing a big overproduction with prices below harvesting costs every 10 years. There is a big risk Western Europe is loosing this production to low-cost countries. This happened in Strawberry for processing in Denmark and Sweden already 20 years ago.

One problem is that too many countries are only selling concentrate for juice. Therefore the supermarkets/chains are controlling the market/prices. NZ Black Currants are being processed for juice, powder for capsules, nutrisuiticals marketed by Just the Berries run by the grower David Eder. The health aspects of Currant make a great story being told on NZ. This should be told on a global basis adding some value to the products.

Berry industry in Poland

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Keywords:

Poland is one of the major berry fruit producer in EU-27. Poland is also the most significant EU producer of berry concentrated juices and frozen berries. Frozen berry fruit supplies from Poland accounts for ca. 25% of the overall EU import of these products, while supplies of concentrates from Poland accounts for 50% of the overall European import of concentrates. But as far as highly processed preparations are concerned (mainly jams and cans) Poland is not an important EU supplier. Poland is the most major EU supplier as far as frozen raspberries and currants are concerned.

On average in the years 2006-2008, berry fruit accounted for 17% of fruit crops. Berry fruit preparations (concentrates, frozen fruit, jams, compotes, cans) accounted for ca. 50% of the overall quantity and value of fruit preparations and their export. In the years 2006-2008 the share of berry fruit in volume and value of all fruit export accounted for respectively 11% and 25%.

Processing plays a key role in crops management and market supply of almost all kinds of berry fruit. On average in the years 2006/07 – 2008/09 supplies for processing accounted for 70% of the whole market supply of these fruit. This indicator accounts for almost 100% in the case of the market supply of aronia, 85% in the case of the market supply of black currants, 70% - strawberries, 60% - red currants and raspberries, 40% - gooseberries.

Preparation production of berry fruit is still growing. On average in the seasons 2006/07 – 2008/09 it amounted to 315 thousand tones, as compared to 285 thousand tones in the three previous seasons and 235 thousand tones in the seasons 2000/01 – 2002/03. The fastest pace of growth in the present decade shows the production of raspberry preparations. It is estimated that in the seasons 2006/07 – 2008/09 the overall production of the above mentioned fruit surpassed 50 thousand tones and was almost three times bigger than the average production in the seasons 2000/01 – 2002/03. The aronia preparation production doubled in these seasons and amounted to 10-11 thousand tons. The production of black currant preparations increased by 60% and amounted to 50 thousand tons. The production of strawberry preparations increased by 15% and amounted to 180 thousand tons, the production of red currant preparations – by 30% to 15 thousand tons, and the production of gooseberries preparations – by 15% to 7,5 thousand tons. The fastest pace of increase showed the production of concentrated juices made of raspberries, strawberries and aronia. As far as frozen fruit are concerned – the production of frozen raspberries is still growing, while the production of frozen strawberries and gooseberries is stable.

The growth of the production of berry fruit preparations results from the inflow of foreign investor funds to the berry industry and growing supply of fruit for processing resulting from stabilization of domestic consumption and insignificant changes in its export.

The growth of production is accompanied by systematic increase of export of berry fruit preparations – mainly frozen fruit and concentrates. On average in the seasons 2006/07 – 2008/09 frozen berry fruit export increased by 10% (as compared to this from the seasons 2000/01 – 2002/03) and amounted to 175 thousand tons. The export of concentrates increased three times amounting to 30 thousand tons.

The share of export in the production of concentrates accounts for 95-98%, while the share of export in frozen fruit production accounts for 75-85%.

Main problems of the berry industry are following:

- growth of the share of consumer varieties in the crop structure

- small concentration of supplies of berry fruit for processing (small scale of berry fruit production)
- insignificant importance of vertical integration of suppliers and producers (insignificant influence of processing plants on volume and quality of the raw material and its prices)
- high changeability of procurement prices, which results in a changeable economic situation of berry fruit producers and processors
- obstacles in access to credits for processing units and decrease of possibilities of selling berry fruit preparations (economic crisis effect in the European countries).

A Contribution for Research Needs on European Grown Berries

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Keywords: *Physiology*, *All-year-round production*, *Pesticide restrictions*

A lot of new information on berry physiology has been released in the last decade. The need for all year round fresh quality fruit production, bring new challenges for the species we grow and the recent scenario of competitiveness on fresh berry production arise new questions on physiology. Also with the climatic changes that we can now notice new pests and diseases are threatening berries. Recent pesticide restriction increased that threat and launched us on an unknown future for the berry industry.

Berry industry in Turkey

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Keywords: *Berry, industry, progress, Turkey*

Turkey has a long tradition of successful professional fruit growing. The berry industry in Turkey is still young but is maturing quickly and berry industry is important both nationally and internationally. It makes up only a small part of Turkish horticulture in general, but is nevertheless profitable and expanding. We review the development and current status of the Turkey's berry industry and highlight some of the differences among different berry fruits (strawberry, mulberry, raspberry, blackberry, and blueberry). Turkey produces more strawberry than the other berry fruits. The country is leading mulberry fruit production in the world with approximately 60.000 tons production annually. The first commercial strawberry plantations were established in Turkey only 40 years ago and by 2007 they occupied 12.000 ha and produced 150-170 000 t fruit each year. Most Turkish strawberry plantings are of the cultivar 'Camarosa' but there are now plantations of several new cultivars, including Kabarla, Candonga, Festival etc. The strawberry cultivation method used in Turkey is similar to those in EU but there are some regional differences. The biggest difference with Turkey is in the marketing of the crop. Nearly all berry fruits from Turkey are consumed within Turkey. The Turkish home market is large and Turkish people are notably enthusiastic consumers of fresh berry fruit. Furthermore, Turkey has advantage to export berry fruits to other European Union countries. These markets are only a matter of hours away. It is relatively easy to export within the European Union and this has encouraged fragmentation at all levels of the industry. Half of the berry fruits produced in Turkey are generally eaten fresh, although some fruit sold fresh undergo subsequent processing for incorporation into cakes or ice creams. On the other hand, the Turkish berry industry is fragmented, even it is not coordinated well compared the other horticultural industries. Individual plantations are small and most growers also produce other crops. Plantations are in several geographically dispersed and climatically diverse parts of Turkey. However this situation gives some advantages (late harvest etc.). The area in berry fruits increased more than 10-fold from 1980 to 2007.

Research on Viruses and Phytoplasma Infecting EU Berries – Advances, Challenges and Threats

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Keywords: *berry, virus, phytoplasma, vectors*

During the last decade there was a tremendous advance in the identification of viruses and phytoplasmas infecting small fruits (strawberry, raspberry, blackberry, currants and blueberry) in EU and in the development of methods for their detection. This research was supported by EU 5th Framework and 6th Framework projects and COST 863 Action. Sensitive PCR-based diagnostics can facilitate production of certified virus-free, high-quality propagation material for growers. Successful breeding programs for resistance against the aphid *Amphorophora idaei* in raspberry and gall mite in blackcurrant, both vectors of economically important viruses, were conducted at the Scottish Crop Research Institute, U.K. Non-chemical and biological control of vectors and pests are more widely used. Nevertheless, there are still challenges for further research e.g. not-identified rhabdovirus reported from black currant in U.K. and Czech Republic or mystery of E- and R-form of *Blackcurrant reversion virus*.

Unfortunately, the number of European laboratories dealing with small fruit virus-like pathogens is rapidly declining. This is in contrast to the several new Crinivirus and Closterovirus infections transmitted by *Trialeurodes* and *Bemisia* whiteflies in strawberry, which were described in USA as a possible emerging problem in strawberry (Martin and Tzanetakis, 2006) and pose a threat for strawberry production in Europe, too.

High bush blueberry is a new and rapidly expanding crop in Europe. The occurrence of *Blueberry scorch virus* (BlScV) was described in Italy by Ciuffo et al. (2005), for the first time outside of the US territory and is on the EPPO List of Quarantine Pathogens. Currently, we are conducting the first survey on the occurrence of viruses and phytoplasma in blueberry *Vaccinium corymbosum* (high bush blueberry) and naturally occurring *Vaccinium* species in the Czech Republic. Plantations, germplasm collections, propagation materials and wild plants are monitored for symptoms, assayed by ELISA and PCR for *Blueberry scorch virus* (BlScV), *Blueberry shock virus* (BlShV), *Blueberry shoestring virus* (BSSV), *Blueberry leaf mottle virus* (BLMoV), *Blueberry red ringspot virus* (BRRV) and phytoplasma.

This research is granted by the Czech Ministry of Education No. OC 09022

What Challenges Lie Ahead for the Blueberry Varieties of the Future?

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Multibaies, France

Keywords:

At the beginning of the the 20th century, the first pioneers found in the the specie Vaccinium corrymbosum, interesting qualities for developing cultivar selections. Thanks to this work, cultivated varieties have been rapidly realized and the blueberry has become a popular fruit in the USA. Because of the large business with blueberries, the variety selection has remained predominantly American.
In the the USA, the production is divided between industry and fresh. For industry, the fruits are harvested by machine. Because of this, fruits and bushes need specific characteristics for harvesting. For the fresh fruit market, varieties have until now been mostly harvested by hand. Color, size, flavor, and shelf life are the most important traits.
Intra specific crossbreeding has permitted cultivars that will ripen in a 1 ½ month period.
Because of market needs, inter specific crossbreeding has permitted extending the season (ex: Cltr Elliott). This method is limited due to the climate of the growing area. Therefore, it has been necessary to produce in other places without frost constraints. That solution has been restricted by the physiological chilling requirement of the V Corymbosum. Acquired experience in other fruit production permitted thinking that to cross with low chill specie could solve this dilemma. We now have hybrids that need as little as 150 hours chilling which permit planting in any Mediterranean climate.
At the moment, high chill requirement species (Northern Highbush) have been bred the most. Still, improvements are needed in vigor, size, flavor and shelf life. For industrial harvest, most important will be concentrating the berry ripening. Berries also need to be firmer and more uniformly round for rolling.
Lower chill species are not numerous. The best of them are patented and distribution is controlled by the variety owner. These are more recent and need the same improvements as for the Northern Highbush. For those varieties, planted under milder climates, the main challenge will probably be concentrating the ripening season.

New Fruits breeding programme developing in Europe

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New Fruits breeding company – Cesena, Italy

Keywords: *breeding programme, strawberry varieties*

New Fruits is a private company that operates in strawberry breeding and is focused on the production of new varieties suitable for continental climate. The activity started in 1992 from the joint-venture between Raggi Vivai and Geoplant Vivai companies.

The offices and the selection centre are situated in Cesena and Ravenna (Italy).

Our breeding program has produced the following varieties:-Maya (from1998), Roxana (2001), Alba (2002). These three varieties were tested also in the COST 836 variety netwok.

The early variety Alba is well cultivated in Piemonte, Emilia Romagna, Marche and Veneto Region. It is rapidly developing also in Central-Northern Europe and in East European countries, thanks to its early picking period, high productivity and good fruit characteristics. The late variety Roxana is also well cultivated in North Italy, thanks to its very high productivity and very good performance in autumn and bag production.

Now New Fruits is developing two new varieties; Asia, characterized for its high quality fruit and high production and Syria, which we propose for processing, thanks to its good quality fruit characteristics. At the moment 600 hectares of New Fruits varieties are planted every year in Europe.

How to Use Scientific Proves to Create a Retail Brand Name in Frozen Fruit Bussines - Example 'First Fruit', SERBIA

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Keywords: *FIRST FRUIT, frozen fruit, frozen berries*

Thanks to recent scientific researches about berry ingredients related to the health benefits, proving that berry fruit contain high concentrations of potentially beneficial phytochemicals and antioxidants, such as ascorbic acid (vitamin C) and ellagic acid, western companies in frozen fruit bussines created many brand names bringing the berries in frozen condition to the final customers all year arround. Learning from the best, we created 'FIRST FRUIT' - frozen berries products and we have started to destribute it in Serbia in 2003.

Even Serbia was one of the biggest producers of berry fruits and the biggest exporter of frozen raspberry in the world, the local consumption was so low there is no official data about it. Most of those products were exported to EU but with no name packaging, in bulk. In our country, the consumption of berry fruit actually existed only during high crop season for fresh fruit. With changes coming in to the country on the beginning of 2000s, such as increasing salaries, more international companies and people coming to work and live here, more travel abroad for local citizens, and for sure, more information coming from domestic and international scientific and professional papers about berries, people's habits have slowly started to change. Soon after we placed our 'FIRST FRUIT' raspberry, blackberry, sour cherry and strawberry in the market, a few major frozen food companies joined us with their brand names. So, we had to register the brand, and to distinct somehow our brand from them, with new products – fruit berry mix, blueberry, forest mix, strong mix. We supplied all big markets and chains both local and international, together with growing HoReCa (Hotels, restaurants and catering) sector. We also learned from them, too – how to adjust our product, special fruit mixes, sizes, packaging, delivery terms…

The frozen food in total is growing in East Europe countries including Russia, for over 30% per year for last ten years. The 'FIRST FRUIT' has about 30% of local market and we do export some quantity to EU, and hopefully to Japan, Russia, Australia and US. As a company, we already export frozen fruit to all those countries, but our aim would be to make the 'FIRST FRUIT' Serbian brand of frozen berries world wide known.

Olle Svensson AB as Part of Nordic Food Group

Bo Ahlstedt

Olle Svensson Company, Sweden

Keywords:

The company was established 1945 and has had a steady economic growth. It is privately owned and has its headoffice in Olofström, Sweden. The products are packed according to customer requirements (from industrial to retail packing). Most products can also be offered as certified organic (KRAV, CERES, NOP) products.

Many of the products can also be processed and offered as juices, concentrates, purees. The company is aiming to supply their customers with products of the right quality and price.

Session IV – Others

Vaccinium myrtillus: Features of an Industrial Medicinal Plant

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Keywords: *Vaccinium myrtillus, anthocyanins, analysis*

Bilberry (*Vaccinium myrtillus L.*) fruits are well-known source of anthocyanins and their extracts are widely used in dietary botanicals and pharmaceutical market from the treatment of vascular and vision disorders linked to capillary and venous fragility. Bilberry fruits are collected from the wild mainly in Nord Europe being Ukraine Sweden and Finland the major producers. During favourable years the total crop production is around 70.000 tons. Prices of the plant material are influenced by many factors, including the crop production of other berries in USA, and they have raised from 1.5 Euro/Kg in 2001 up to 3.5 in 2007. The pharmaceutical and heath food industry employs more or less 20 % of the crop production manufacturing more than 100 tons of extract. In general it is possible to obtain 1 Kg of extract from 100 Kg of fruits. Bilberry anthocyanins are the main compounds responsible for the therapeutic activity of the extract. The majority of the clinical trials have been performed employing standardized bilberry extract containing 36% of antocyanins. This extract was demonstrated to be effective in the therapy of peripheral vascular diseases and venous-sensitivity or to alteration of microcirculation of the retina at a dosage of 320-480 mg/day corresponding to 100-200 mg/day of anthocyanins.

Barilla Company and Interest on Berry Fruit

Annalisa Bacchi

Barilla Company, Parma, (Italy)

Keywords:

Barilla, originally established in 1877 as a bread and pasta shop in Parma, is today one of the top Italian food groups: a leader in the pasta business worldwide, in the pasta sauces business in continental Europe, in the bakery products business in Italy and in the crispbread business in Scandinavia.

The Group employs more than 18,000 people and in 2007 had net sales of more than euro 4,2 billion (70% camin from bakery market and 30% from meal solutions).

The Company has been managed for over 130 years by one family's entrepreneurial experience and is now run by the fourth generation siblings: Guido, Luca, Paolo Barilla.

Barilla owns 54 production facilities (14 in Italy and 40 outside Italy);

Barilla exports to more than 140 countries. Every year more than 3 millions tons of food products, with the brands Barilla, Mulino Bianco, Voiello, Pavesi, Wasa, Harry's (France, Spain and Russia), Lieken Urkorn, Golden Toast and Kamps (Germany), Alixir, Academia Barilla, Misko (Greece), Filiz (Turkey), Yemina and Vesta (Mexico), are featured on dining tables the world over. The Number1 brand, a Group company engaged in logistics activities stand alongside the product brands.

Barilla is convinced that good eating habits are the key to good health. That's why the Group's products are designed to offer not only good taste, but also good nutrition.

Based on the Mediterranean diet and daily consumption of grains, Barilla has established some basic concepts that underlie this commitment to consumer health, as using safe, whole raw materials of high quality; using naturally nutritious ingredients and their natural derivatives to improve the nutritional value of products; developing processes that keep those products wholesome and promoting the consumption of Fruits and Vegetables.

Barilla relies on experts from the Nutrition Advisory Board, as well as from external research centers, to stay ahead of the curve on emerging nutritional trends and to stay informed about advances in scientific research on the subject.

Recently Barilla invested in the research of the functional food sector starting from the natural origin of the raw materials. Therefore, berry fruits, rich in minerals, fibers, vitamins, phytochemicals are considered ingredients with high potentialities to contribute to the next end-products generation.

POSTERS

Poster

Research on Pathogen and Pest-Free Ribes Propagation Material

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Keywords: *Virus, phytoplasma, gall mite, Ribes, tissue culture, currant*

A new research programme aimed at improving the quality of black currant and red currant propagation material started in the Czech Republic in 2009. It is based on co-operation between the Institute of Plant Molecular Biology (IPMB) – a public, fundamental research-oriented institution and Research and Breeding Institute of Pomology Ltd. (RBIP) – a private company, oriented on fruit crop breeding and propagation, germplasm collection and extension services e.g. integrated control of diseases of fruit crops. The project is exploiting IPMB´s experience in detection and identification of viruses and phytoplasma infecting *Ribes* by biological, serological (ELISA), molecular methods (RT-PCR, RFLP, sequencing) and electron microscopy. This will be combined with the RBIP´s experience in tissue-culture virus elimination, propagation and maintenance of virus-free clones in technical and field isolates and check of truenes-to-type fruit quality. IPMB´s task is to test candidate plants for viruses listed in the EPPO Certification scheme for *Ribes* and to re-test plants after thermo and chemotherapy used for *in vitro* virus elimination and propagation. The project involves also elimination of the gall mite *Cecidophyopsis ribis* the vector of *Blackcurrant reversion virus* and other pests by non-chemical treatment.

The aim of the project is to produce and multiply 6 certified *Ribes* cultivars fulfilling the criteria of the EPPO Certification scheme for *Ribes* (Anonym 2008) and ready-to-use by farmers.

This research is funded in the Czech Republic by the National Agency for Agricultural Research Project No. QH 91224 and supported by COST 863 Action.

Poster

COTHN an Exemple in Berry Technology Transfer

A. P. Nunes and M. C. Martins

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Keywords:

The Centro Operativo e Tecnológico Hortofrutícola Nacional (COTHN) became a private association on July 11, 2001 and was founded by twenty six members (Grower Organizations, Sellers Associations, Universities and Research Institutes - INIA and IDHa). Currently it involves fifty partners and seven institutions. The COTHN main objective is to promote the development of the Portuguese horticulture chain, especially through the participation in experimental development projects, improvement of knowledge level in the sector, deepening the cooperation and the partnerships in areas of technological transfer and organization. It also intends to promote closer links between the companies and the R&D institutes, as well as between public and private institutions through:

a) Promotion and participation in the experimental development projects;

b) Implementation of research studies and integrated development actions in the horticultural sector;

c) Formation of technicians and managers in technological and organizational areas;

d) Assistance to the associated institutions in marketing and management areas.

The berries sector of COTHN has actively contributed to the technological transfer of several research projects under the coordination of the INRB (former INIA). It has also organized field workshops for technicians and growers located in the places where the technological transfer is promoted. More recently it was involved in the organization of the III National Colloquium of Berry Production held in Sever do Vouga on the 26th and 27th of June of 2008.

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