



**COST863**  
**International Berry Summer School**  
**(IBSS)**

*Genetic approaches for improving berry adaptability  
and nutritional quality*

Minute

May 25 – 30

Ancona – Cesena (IT)



Università Politecnica delle Marche  
*Alma Mater Studiorum* Università di  
Bologna





The COST863 International Berry Summer School (IBSS) entitled *Genetic approaches for improving berry adaptability and nutritional quality* has been held in Ancona and Cesena last May 25-20, 2009. The course was targeted to participants with a solid foundation in berry breeding, molecular biology, cultivation technology and who have current or defined plans for research in the area of berry genetics and cultivation technology, within the theme of berry production. For the selection of the students, the coordinator of the IBSS opened a call for the submission of the applications and students were then selected on the correspondence of their curricula to the targets of the school. From this selection were identified 27 students (15 female), from 17 EU countries, most of them as Ph.D. students as researchers employed in public or private organizations involved in berry industry. All these students were supported with the COST budget. About other 10 experts from national international industries and from the local University also followed the program of the school.

The course was divided into hands-on modules, combining plenary lectures, laboratory and field training, all this organized at the Marche Polytechnic University (Ancona). The teaching program was focused on the main aspects of breeding and biotechnology programs currently applied to berries (strawberry, raspberry, blackberry, blueberry and black and red currant) for the production of new varieties with increased adaptability to different cultivation conditions and improved fruit quality and nutraceutical value. The official language of the workshop was English. Visits to different berry fields were also organized.

The first day of the school (Monday, May 25) was organized with a full day of seminars, in the morning focused on important aspects such as: Berry plant physiology, presented by *Davide Neri (IT)*; Berry Aroma compounds (*Detlef Ulrich, GE*); Strawberry ploidy and molecular markers (*Beatrice Denoyes-Rothan, FR*); Breeding and biotech for Nutritional Quality (*Bruno Mezzetti – IT*).

In the afternoon were expected three lectures specifically addressed to underline the importance in berry research on: Strawberry functional genomics (*Kevin Folta - USA*); Utilizing wild germplasm in strawberry breeding (*J.F. Hancock - USA*); and Informatic models for Pest Management (*Pedro Palencia García - SP*).

The second day of the school (Tuesday, May 26) was organized including seminars in the morning and laboratory training in the afternoon. The seminars were focused on the following topics: Raspberry breeding and biotechnology (*Nikki Jennings - UK*); GMO and biosafety in berry (*Bruno Mezzetti - IT*); Post-harvest technology in Strawberry (*Fátima Martínez Ruiz - SP*); Induced biotic stress resistance in strawberry (*Gianfranco Romanazzi, IT*). In the afternoon, the laboratory training was organized in the laboratories of the departments of Environmental and Crops Science (Faculty of Agriculture) and Biochemistry (Faculty of Medicine) and included 3 groups focused on the following different topics: Quality and bioactive compounds (organized by *Maurizio Battino*); Plant Architecture (organized by *Davide Neri*) and Regeneration and Genetic transformation (organized by *Bruno Mezzetti*).

The third day of the school (Wednesday, May 27) was organized including seminars in the morning and field training in the afternoon. The seminars were focused on the following topics: Breeding blackberry (*Chad Finn – USA*); *Ribes* crops (Blackcurrant and gooseberry) (*Stan Pluta – PL*); Breeding blueberry (*Jessica Scalzo - NZ*).

The field training expected in the afternoon was organized at the experimental station of the Faculty of Agriculture where are active the strawberry breeding program and the strawberry and raspberry variety evaluation program of the Marche Polytechnic University. The field training activity was based on the description of the different material (varieties and selections) available in the strawberry and raspberry fields. Furthermore, a really interesting experience was the direct practicing with the students on subjective plant and fruit evaluation. All the main characters to be considered in the evaluation of strawberry seedlings, selections and varieties, were discussed.

In the evening of these last two days were also organized social events such as dinners, with typical products, that resulted very important to promote better integration among experts participating to the school.

Aspects related to fruit nutraceutical value were deeply developed in the international conference on “**FOOD-OMICS: a science for nutrition, health and wellness in the post-genomic era**” (<http://foodsci.unibo.it/foodomics/>), organized in collaboration with COST863 – IBSS and the Food Science Department of Bologna University, at the Cesena campus. See program: [http://foodsci.unibo.it/foodomics/index\\_file/program.pdf](http://foodsci.unibo.it/foodomics/index_file/program.pdf) (28<sup>th</sup>-29<sup>th</sup> May 2009).

The application of the -omics approach in food sciences (**Foodomics**) plays an important role in the understanding of the nutritive potentials of a conventional or modified food; on the other hand, allows us to better understand why not all foodstuffs can be eaten by everyone, so encouraging the development of a "technology" for producing food made to measure, or of a "science" for the preparation of personalized diets. For this reason, the University of Bologna and Polytechnic University of Marche, in collaboration with the Cost international863 Berry summer School, organized a two days meeting, to explore the up to day studies according to the “omics” science.

The conference was co-founded by “Fondazione Cassa di Risparmio di Cesena”, Bruker and Marche Biotech, with the sponsorship of Ser.In.Ar, Presidenza del Consiglio del Comune di Cesena and S.I.N.U. (Italian Society of Human Nutrition). Invited speakers were partially supported by COST and these other co-founder.

The international conference "Food-omics: a science for nutrition, health and wellness in the post-genomic era" touched different topics into two different sessions that address the definition of molecular quality of conventional food, the effects of (bio)technological processing on the molecular profile of food, the interaction between nutrients and human genes, the study of the nutritional and general health state of humans through the definition of their metabolic profile, the beneficial or toxic effects of individual classes of substances isolated from food, and more yet.

The conference was held in Cesena, a city located in the Italian territory marked by a strong eno-gastronomic tradition, location of the Food Sciences Campus of Alma Mater - University of Bologna.



The conference consisted of invited lectures organized in thematic sessions covering, as much as possible for a two-days frame, the comprehensive genomics, proteomics and

metabo(l/n)omics of food and its interactions with humans. During the first day, a specific session has been dedicated to the 70 posters presented by researchers of whole over the world.


The 200 of participants were welcomed in the suggestive Aula Magna of the University of Psicologia, where all the conference took place.

The main topic of **the first day of Conference** was “**Improving Food Security, Safety and Quality**”; discussions were led by *Bruno Mezzetti* (1<sup>st</sup> part), and *Luisa Mannina* (2<sup>nd</sup> part), as chairmen The lectures in program were:

1<sup>st</sup> part:

- Maura Cardarelli, Università La Sapienza, Italy: “Auxin and jasmonic acid interaction in the control of late stamen development in Arabidopsis”
- Kevin Folta, University of Florida, USA: “Rosacea genomics: new impacts in basic biology and crops science” 
- Chad Finn, United States Department of Agriculture - ARS, USA: Genetic Resources: as a source of genes for fruit nutritional quality 

2<sup>nd</sup> part:



- Ian Givens, University of Reading, UK “Animal-derived foods in relation to chronic diseases”
- Cécile Berri, INRA, France: “Improving meat quality by regulating animal feeding and genetics: recent advances in poultry”
- Ian Colquhoun, Institute of Food Research, UK: “Metabolomics and other methods for tracing the origin of chicken meat”
- Tiziana Pandolfini, Università di Verona, Italy: “Functional genomics of fruit development in horticultural plants”
- Margit Laimer, University of Natural Resources and Applied Life Sciences, Austria: “Allergene genes in fruit” 

The topic of the **second day of Conference** was “**When Food Meets Man**”; discussions were led by *Alessandra Bordoni* (1<sup>st</sup> part), *Francesco Capozzi* (2<sup>nd</sup> part), and *Harry Kuiper* (3<sup>rd</sup> part). The lectures in program were:


1<sup>st</sup> part:

- Lynnette R. Ferguson, University of Auckland, New Zealand: “Could studies on gene-nutrient interaction maintain the promise of good health and/or prevention of chronic diseases?”
- Emma De Fabiani, University of Milan, Italy: “When food meets man: the epigenetic approach”
- Adrie J. Verhoeven, Department of Biochemistry, Rotterdam, The Netherlands: “Activation of human transcription factors by food components”

2<sup>nd</sup> part:

- Paul Kroon, Institute of Food Research, UK: “When man ingests polyphenols: what happens to the polyphenols and how do they influence cardiovascular function?” 
- Derek Stewart, Scottish Crop Research Institute, UK: “Soft fruit - A nutritional nirvana?” 
- Claudio Nicoletti, Institute of Food Research, UK: “Cellular and molecular immunological events in food allergy”

3<sup>rd</sup> part:

- Claudio Luchinat, CERM University of Florence, Italy: “Individual human phenotypes in metabolic space and time”
- Esther Kok, RIKILT Institute of Food Safety, The Netherlands: “The use of omics technologies as part of the comparative safety assessment of newly developed (GM) plant varieties” 

- François-Pierre Martin, Nestlé Research Center, Switzerland: “Monitoring of healthy metabolic trajectory with nutritional metabolomics”
- Søren Engelsen, University of Copenhagen, Denmark: “NMR spectroscopy and Chemometrics: new interdisciplinary playgrounds for nutritionists and food scientists”



At the conference was delivered an abstract booklet containing abstracts related to the work presented by the invited speakers and also to 70 poster posters (see also attached file).

The last event of the IBSS was the visit at the Martorano 5 Experimental station where is active the Strawberry breeding program coordinated by Dr. Walther Faedi.

As final consideration the International Summer Berry School was considered an important opportunity to bring together different expertises, competences. Without this effort many experts would never have had this opportunity. Many collaborations were built and new friendships found. This opportunity have made more science possible, and that will benefit all of participants and those that will benefit from higher-quality berries.