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# The role of stress on the unravelling of somatic embryogenesis competence

Sergio Ochatt

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# PRODUCTION AND ESTABLISHMENT OF MICROPROPAGATED PLANTS

6<sup>TH</sup> INTERNATIONAL ISHS SYMPOSIUM



**BOOK OF ABSTRACTS PREVIEW**

*19-24 April 2015*

*Grand Hotel Londra – Sanremo – Italy*

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## FOREWORD

The 6<sup>th</sup> International Symposium on Production and Establishment of Micropropagated Plants (PEMP) is endorsed by the ISHS Commission “Molecular Biology and *In Vitro* Culture” and co-endorsed by the Section Ornamental Plants. The symposium continues the tradition of previous five symposia named AEMP (Acclimatization and Establishment of Micropropagated Plants) and it is addressed to encourage free and open exchanges of scientific researches and ideas relating to the management of different aspect of *in vitro* plant culture, with particular attention to classical and advanced micropropagation technologies. The different keynote speakers and authors of selected oral and poster presentations are presenting researches whose efforts are made in order to produce micropropagated plants in a more efficient and profitable way which could be readily available to the horticulture industry and final consumers. A specific section addressed to highlight new production niches and new roles for tissue culture companies is previewed.

The records about participants, updated to the date of printing of this volume, highlight the presence of more than 200 research scientists, industry representatives and professionals involved in plant micropropagation from 50 countries. In the program, 140 posters and 52 oral presentations have been included. The Symposium will focus on four different sections:

**Session 1** (Part 1 & 2, Monday 20<sup>th</sup> April) – **Understanding *in vitro* growth.** In this session lectures, oral and poster presentations addressed to understand the mechanisms underlying the regeneration systems and the *in vitro* growth will be considered. Two key lectures will be included in the session. 1) “*The role of stress on the unraveling of somatic embryogenesis competence*” presented by Sergio Ochatt from INRA / PCMV - Dijon, France, who will focus the relationships between embryogenesis and stress and will discuss their impact on the development of novel genotypes more apt for a sustainable agriculture; 2) “*Factors affecting the axillary and adventitious shoots formation in woody plants in vitro*” presented by Ivan Iliev from University of Forestry - Sofia, Bulgaria, who will provide example of commercial and scientific benefits which could arise from the use of the *in vitro* technique in the woody plants sector.

**Session 2** (Part 1 & 2, Tuesday 21<sup>st</sup> April) – **Managing micropropagation process.** This session will focus several aspects faced during the managing of the micropropagation process e.g. contamination problems, *in vitro* nutrition, physical and chemical factors affecting *in vitro* growth, epigenetic changes and somaclonal variation. Three key lectures will be presented. Two of them, 1) “*Plant Tissue Culture contamination: challenges and opportunities*” by Edwin Herman from Agricell Report - Shrub Oak, New York, USA, and 2) “*Volatile indicators of contamination in tissue cultures*” by Stefaan Werbrouk from University of Ghent - Laboratory of



Applied In Vitro Plant Biotechnology, Ghent, Belgium will present innovative aspects in facing a well-known problem issue for *in vitro* plant culturists. The third one, “*Epigenetic and genetic occurrence in plantlets cultured in vitro: how to deal with them*” by Rosario Muleo from University of Tuscia - DAFNE - Laboratory of Molecular Eco-Physiology and Biotechnology of woody plant - Viterbo, Italy, will review experiences on genetic and epigenetic changes occurring in the micropropagated plantlets by providing arguments of discussion about the legal precepts regulating the vegetative propagation.

**Session 3 (Wednesday 22<sup>nd</sup> April) – Rooting and establishment of micropropagated plantlets.**

This section will deal with underlying mechanism of rooting process, rooting recalcitrance, acclimatization losses and field evaluation of *ex vitro* plantlets. The key lecture “*Acclimation ex vitro: how to improve the root system*” performed by Davide Neri, Polytechnic University of Marche - Ancona, Italy, will provide useful insights on physiological and technological approach to this delicate phase of micropropagation process. The key lecture “*Commercial use of endophytes in micropropagation*” by Carolin Schneider, Institut für Pflanzenkultur - Schnega, Germany, will introduce us to the theme of biotization of plantlets and the knowledge of how the quality of micropropagated plantlets and the cost of the process can be influenced by plant-microbe interactions.

**Session 4 (Wednesday 22<sup>nd</sup> April) – Micropropagation industry: new niches and roles for tissue culture companies.**

This session has been conceived to include specific aspects of micropropagation industry. The key lecture “*The potential of Bioreactor Technology for Large-scale plant micropropagation*” by Ibrahim Rusli, Malaysian Nuclear Agency / Agrotechnology & Biosciences Division - Banji, Malaysia, Asia, will present the practical applicability of this system in plant propagation and a new type of bioreactor will be presented. Following selected oral presentations dealing with biopharming and testimonials from industry representatives.

In our program we inserted n.9 endearing presentations “*From bench to market*” intended to give the industrial and commercial point of view. Two technical tours scheduled on Thursday 23<sup>th</sup> April will give the opportunity to take a view of the production reality of our region, particularly addressed to the sector of ornamental plants. Both tours included the visit of four companies. The first tour is addressed to visit the productive reality of Sanremo and surroundings which is mainly addressed to cut flowers and where important breeder companies are located; the second tour considers the visit to the productive reality in Albenga, an area specialized in pot production and aromatic plants.



As a means of promoting the researches of young scientists, the Regional Institute for Floriculture (IRF), Sanremo, has organized a competition addressed to PhD students and young researchers who have earned the PhD title for less than one year: the four winners will be invited to present their works during the conference. A Panel of experts have judged the scientific quality, originality, topic significance and the relevance to the congress themes of the presented works. Our deepest thanks to all the members of the Scientific Awards Committee who helped us with their valuable contributions.

The term “symposium” derives from the greek *syn + pinein*, which means drink together, and we will try to welcome you into an atmosphere in which our conversations and reflections will be accompanied by social occasions where you can enjoy the gastronomic specialties of our Region. A post-congress tour scheduled on Friday 24<sup>th</sup> April will give you the opportunity to discover the capital of our Region, Genoa, with a visit to one of the Rolli Palaces added to the list of UNESCO World Heritage Sites in 2006. In the afternoon we will make a boat trip towards Portofino which is a fantastic location, based in the Riviera Ligure, considered by many one of the world’s eight wonders.

We would like to acknowledge all the members of the Organizing and Scientific Committees which have given a significant contribution in providing the participants with a high standard under a scientific and logistic point of view. We hope that each participant can appreciate it; we apologize for any shortcomings and we encourage the participants to forward suggestions / comments which can help to improve us.

Last but not least, our special thanks to the different institutions and private companies which with their sponsorship and their support made this symposium feasible.

The Convener

*Margherita Beruto*





## 6<sup>th</sup> International Symposium on Production and Establishment of Micropropagated Plants

19-24 April 2015 - Grand Hotel Londra - Corso Matuzia 2 - 18038 Sanremo (Imperia) – Italy

### ACKNOWLEDGEMENTS



The Symposium is organized under the scientific sponsorship of **ISHS** (International Society for Horticultural Science).

The event is endorsed by the **ISHS Commission “Molecular Biology and *In Vitro* Culture”** and co-endorsed by the **Section Ornamental Plants**.

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The Symposium is organized by the **Regional Institute for Floriculture (IRF)**, Sanremo, and it is convened by Margherita Beruto.



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Corso degli Inglesi 18, 18038 Sanremo (IM), Italy



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## **SYMPOSIUM PROGRAM**



## 6<sup>th</sup> International Symposium on Production and Establishment of Micropropagated Plants

19-24 April 2015 - Grand Hotel Londra - Corso Matuzia 2 - 18038 Sanremo (Imperia) – Italy

### MONDAY 20 APRIL 2015

8.00-9.45 **REGISTRATION, POSTER DISPLAYING AND WELCOME COFFEE**

9.45-10.00 **WELCOME AND OPENING CEREMONY**

	Welcome 6 <sup>th</sup> PEMP Convener	Margherita Beruto	Italy
	Welcome ISHS President	Roderick A. Drew	Australia
10.00-10.45	Welcome Chair Commission <i>In vitro</i>	Maurizio Lambardi	Italy
	Welcome Chair Section Ornamental	Margrethe Serek	Germany

#### SESSION 1 – PART 1 – UNDERSTANDING *IN VITRO* GROWTH

**CHAIRS: Sergio Ochatt & Maria Antonietta Germana**

10.45-11.15	<i>The role of stress on the unraveling of somatic embryogenesis competence</i>	Sergio Ochatt	France
11.15-11.30	<i>Somatic embryogenesis as a recommendable system for fern in vitro propagation</i>	Jan J. Rybczyński	Poland
11.30-11.50	<i>Mass clonal propagation of conifer trees via somatic embryogenesis: Scale-up and Automation</i>	Pramod Gupta	USA
11.50-11.55	<i>Are we able to modulate the response of somatic pines to drought stress?</i>	Paloma Moncaleán	Spain
11.55-12.00	<i>Comparison of two protocols for somatic embryo induction in sulawesi elite Theobroma cacao L. clone</i>	Mimi Ulfa Bustami	Belgium
12.00-12.05	<i>Micropropagation of date palm (Phoenix dactylifera L.) using cell suspensions established from vegetative and floral explants</i>	Djamila Yatta	Algeria
12.05-12.10	<i>Somatic embryogenesis for micropropagation of selected conifer species</i>	Terézia Salaj	Slovak Republic
12.10-12.30	<i>Plant production with the SE-Fluidics system</i>	E-M. Ulrika Egertsdotter	USA

12.35-14.00 **LUNCH**



## MONDAY 20 APRIL 2015

### SESSION 1 – PART 2 – UNDERSTANDING *IN VITRO* GROWTH

**CHAIRS: Ivan Iliev & Ivana Gribaudo**

14.00-14.30	<i>Factors affecting the axillary and adventitious shoots formation in woody plants in vitro</i>	Ivan Iliev	Bulgaria
14.30-14.45	<i>Screening pear germplasm for in vitro nitrogen requirements</i>	Wada Sugae	USA
14.45-15.00	<i>Castanea spp. hybrid clones in vitro conservation: synthetic seeds vs slow growth</i>	Filomena Gomes	Portugal
15.00-15.15	<i>A multi-years study on the regenerative potential of several Vitis genotypes</i>	Ivana Gribaudo	Italy
15.15-15.20	<i>Encapsulation of black mulberry microcuttings: studies on capsules and synthetic seeds</i>	Letizia Martorana	Italy
15.20-15.25	<i>Identification and micropropagation of common ash clones resistant to fungus Hymenoscyphus fraxineus</i>	Jana Šedivá	Czech Republic
15.25-15.30	<i>Micropropagation of mature Juglans hybrids</i>	Andreas Meier-Dinkel	Germany
15.30-15.50	<i>SETIS™, advanced temporary immersion systems for plant micropropagation</i>	Frank Kors	The Netherlands
15.50-16.05	<i>Enhancing the efficiency of the liquid culture system for oil palm clonal production through innovative technologies</i>	Hashim Ahmad Tarmizi	Malaysia
16.05-16.20	<i>Micropropagation of different species in solid medium and the new Plantform bioreactor</i>	Margareta Welander	Sweden
16.20-16.35	<i>Improvement of shoot proliferation by liquid culture in temporary immersion</i>	Maurizio Lambardi	Italy
16.35-16.50	<i>Comparison of efficiency of container materials in temporary immersion bioreactor system for Globba micropropagation</i>	Nopmanee Topoonyanont	Thailand
16.50-16.55	<i>Comparison of in vitro multiplication of sugarcane cultivated in liquid culture medium and in temporary immersion bioreactors: biochemical and molecular variables</i>	Lilia Willadino	Brazil
16.55-17.15	<b>OPEN DISCUSSION</b>		
17.15-17.30	<b>COFFEE BREAK</b>		
17.30-20.30	<b>GUIDED TOUR IN SANREMO AND INFORMAL DINNER TOGETHER IN THE CITY (INCLUDED IN THE REGISTRATION FEE)</b>		



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### TUESDAY 21 APRIL 2015

8.00-9.00 **REGISTRATION**

#### SESSION 2 – PART 1 – MANAGING MICROPROPAGATION PROCESS

**CHAIRS: Edwin Herman & Barbara Reed**

9.00-9.30 *Plant Tissue Culture “Contamination”: Challenges and Opportunities.* Herman Edwin USA

9.30-9.45 *Effect of carbon nanotubes in micropropagation of GF677 (Prunus amygdalus x Prunus persica) rootstock* Hassan Sarikhani Iran

9.45-10.00 *Effect of cytokinin on curly birch shoot growth, amino acid content and fatty acid composition of lipids in vitro* Lidia Vetchinnikova Russia

10.00-10.15 *Verulidze G. - Batumi Shota Rustaveli State University - Georgia - The effects of low-level laser irradiation on growth of microshoots of blackberry* Gulnara Verulidze Georgia

10.15-11.00 **COFFEE BREAK**

11.00-11.30 *Epigenetic and genetic occurrence in plantlets cultured in vitro: how to deal with them* Rosario Muleo Italy

11.30-11.45 *Molecular markers clonal fidelity and antioxidant properties of micropropagated horticultural crops* Samir C. Debnath Canada

11.45-12.00 *Production of medicinal quality Centella asiatica (L.) Urban using in vitro tetraploid induction and micropropagation* Sompop Prathanurug Thailand

12.00-12.20 *Intellectual property in asexually reproduced crops: research and innovation need a strong protection for the benefit of the society* Andrea Mansuino Italy

12.20-14.00 **LUNCH**



## TUESDAY 21 APRIL 2015

### SESSION 2 – PART 2 – MANAGING MICROPROPAGATION PROCESS

**CHAIRS: Stefaan Werbrouck & Barbara Ruffoni**

14.00-14.30	<i>Volatile indicators of contamination in tissue cultures</i>	Stefaan Werbrouck	Belgium
14.30-14.45	<i>Abiotic stress during in vitro propagation affects the quality of tissue-cultured plants: the development of hyperhydricity</i>	Frans Krens	The Netherlands
14.45-15.00	<i>In vitro studies on the effect of plant growth regulators, light intensity and LED on plant growth and volatile compound of Hyptis suaveolens (L.)</i>	Josè Eduardo Brasil Pereira Pinto	Brazil
15.00-15.15	<i>Effects of BAP and meta-Topolin on in vitro multiplication of Dendrocalamus asper (Schult. &amp;Schult. f.) Baker ex K. Heyne</i>	Miguel Pedro Guerra	Brazil
15.15-15.30	<i>In vitro propagation of Habeneria Hybrids</i>	Chamchuree Sotthikul	Thailand
15.30-15.35	<i>Effect of chemical and physical factors in vitro propagation and volatile analysis of Aloysia triphylla (L'Herit) Britton</i>	Suzan Kelly Vilela Bertolucci	Brazil
15.35-15.40	<i>The effects of cytokinin treatment of nodal cuts and petioles on the shoot regeneration of Campanula portenschlagiana cv. Blue Ocean</i>	Zeinab Ghayoor Karimiani	Germany
15.40-15.45	<i>Propagation of pistachio applying in vitro culture techniques</i>	Juan A. Marin	Spain
15.45-15.50	<i>Screening, selection and in vitro propagation of Solanum nigrum genotypes with high Fe and Ca content</i>	Shakira Shaik	South Africa
15.50-15.55	<i>Micropropagation of Micromeria croatica (Pers.) Schott</i>	Snježana Kereša	Croatia
15.55-16.00	<i>Factors affecting embryogenesis in Rosa hybrida 'Ocean Song'</i>	Pejman Azadi	Iran
16.00-16.05	<i>The biotechnology approaches of Canna (Canna × hybrida hort.) regenerants obtaining</i>	Irina Mitrofanova	Russia
16.05-16.10	<i>Micropropagation of clonal rootstocks of apple for their commercial exploitation</i>	Modgil Manju	India
16.10-16.15	<i>Micropropagation of tamarillo: from the lab to the field</i>	Jorge Canhoto	Portugal
16.15-16.30	<i>In vitro propagation as a mean of producing native plants for use as ornamentals in archaeological sites of Greece</i>	Maria Papafotiou	Greece
16.30-17.00	<b>OPEN DISCUSSION</b>		
17.00-18.30	<b>COFFEE BREAK + POSTERS VISION</b>		
17.00-17.45	<b>ISHS MEETING (FOR ISHS MEMBERS)</b>		
18.30-20.00	<b>DRINK AND MUSIC TOGETHER WITH THE OPERA SINGER ANTONELLA BANAUDI AT ROYAL HOTEL IN SANREMO (INCLUDED IN THE REGISTRATION FEE)</b>		





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### WEDNESDAY 22 APRIL 2015

8.00-9.00 **REGISTRATION**

#### SESSION 3 – ROOTING AND ESTABLISHMENT OF MICROPROPAGATED PLANTLETS

**CHAIRS: Davide Neri & Carolin Schneider**

9.00-9.30 *Acclimation ex vitro: how to improve the root system* Davide Neri Italy

9.30-9.45 *Steering stomatal development by chemicals or LED lighting during acclimatization of micropropagated plantlets* Emmy Dooghe Belgium

9.45-10.00 *Differences in cytokinin metabolism as a tool to understand and improve rooting and establishment of micropropagated plantlets* Karel Dolezal Czech Republic

10.00-10.15 *In vitro rooting of eucalyptus: the role of phytohormones* Muhammad Nakhoda South Africa

10.15-10.45 **COFFEE BREAK**

10.45-11.15 *Commercial use of endophytes in micropropagation* Carolin Schneider Germany

11.15-11.20 *Effect of a non-mycorrhizal endophyte isolated from Mentha piperita L. on in vitro Ocimum basilicum L. cuttings* Marco Mucciarelli Italy

11.20-11.25 *Arbuscular mycorrhizal fungi for post-vitro inoculation of micropropagated Ranunculus asiaticus plantlets: an useful alliance?* Roberto Boriello Italy

11.25-12.45 *In vitro management of rooting and hardening efficiency: case studies at HilverdaKooij* Gyuri Fenyvesi The Netherlands

11.45-11.50 *Burkholderia phytofirmans PsJN promotes in vitro rooting and acclimatisation of Helleborus niger* Teresa Orlikowska Poland

11.50-11.55 *Acclimatization performances of ornamental species related to in vitro growth conditions* Ermanno Sacco Italy

#### AWARD CERIMONY

*Endogenous cytokinin profiles of in vitro grown kohlrabi hypocotyl and seedling explants with their respective shoots regenerated via indirect organogenesis* Tatjana Ćosić Serbia

11.55-12.30 *Comparison between a conventional culture system and Plantform bioreactor in Quercus robur micropropagation* Enrico Gatti Italy

*Gentian 'Little Pinkie' and the production of explants as influenced by ethephon and growth duration in vitro* Marzieh Keshavarzi New Zealand

*Establishment of hairy root culture from Stevia rebaudiana Bertoni explants* Żaneta Michalec-Warzecha Poland

12.30-14.00 **LUNCH**



**WEDNESDAY 22 APRIL 2015**

**SESSION 4 – MICROPROPAGATION INDUSTRY: NEW NICHEs AND ROLES FOR TISSUE CULTURE COMPANIES**

**CHAIRS: Ibrahim Rusli & Margrethe Serek**

14.00-14.30	<i>The Potential of Bioreactor Technology for Large-Scale Plant Micropropagation</i>	Ibrahim Rusli	Malaysia
14.30-14.45	<i>Biopharming: Carica papaya compounds with antibacterial efficacy</i>	Nate Jamieson	Australia
14.45-14.50	<i>Evaluation of essential oils content in S. dolomitica plants cultured in vitro</i>	Laura Bassolino	Italy
14.50-14.55	<i>Establishment of vitroplants from female flowers of Aerva javanica L., a medicinal plant of arid lands in Algeria</i>	Djamila Chabane	Algeria
14.55-15.00	<i>Production of adventitious roots and antioxidant compounds in Polygonum multiflorum by using an balloon-type airlift bioreactor</i>	Kyung-Ju Lee	Republic of Korea
15.00-15.20	<i>L&amp;J BioTech, an exemple of plant tissue culture laboratory involved in niche markets</i>	Laurent Jouve	France
15.20-15.40	<i>The Use of Micropropagated Rubber Trees (Hevea brasiliensis) to Establish Plantations: Testimony of the SOCFIN Group</i>	Aurelién Masson	Ivory Coast
15.40-16.00	<i>Commercial micropropagation of fruit varieties and rootstocks in Europe: an overview on problems and future prospects</i>	Giuliano Dradi	Italy
16.00-16.20	<i>Production of dihaploids through anther culture in caraway, peas and flax using novel cytokinin derivatives</i>	Iva Smykalova	Czech Republic
16.20-16.50	<b>OPEN DISCUSSION</b>		
16.50-17.20	<b>COFFEE BREAK</b>		
17.20-17.40	<b>OFFICIAL CLOSING</b>		
19.00-20.30	<b>SIMPHONY ORCHESTRA CONCERT AT CASINO</b>		
21.00-23.00	<b>GALA DINNER</b>		



## **6<sup>th</sup> International Symposium on Production and Establishment of Micropropagated Plants**

19-24 April 2015 - Grand Hotel Londra - Corso Matuzia 2 - 18038 Sanremo (Imperia) – Italy



## **SOCIAL EVENTS**



## SUNDAY APRIL 19

### Welcome reception

<i>Start time:</i>	15.00
<i>End time:</i>	19.00
<i>Meeting point:</i>	Istituto Regionale per la Floricoltura (IRF), Via Carducci 12, Sanremo
<i>How to reach the meeting point:</i>	A shuttle is available every half an hour from Hotel Londra, the venue of the congress, to IRF
<i>Price:</i>	Included for all registered participants and registered accompanying persons. A specification of the interest in this event should have been manifested in the filled registration form.

Villa Le Guardiole, now the headquarters of the Regional Institute for Floriculture (IRF), is situated on the hills behind the city of Sanremo.



The name “The Guardiole” recalls a page of terror in the history of the city marked by the Saracens; the “guardiole” were watchtowers that dominated the sea and that allowed to see the movements of ships. From this place, in fact, the point of view for the observation of the city is beautiful.



The villa, with its impressive neoclassical facade, was designed in the early twentieth century by the engineer and architect Pietro Agosti.



In past the villa was property of the English family Brodie and subsequently of the American family Gould to which belonged Pat Gould, keen tennis player and protagonist of the Sanremo high life a few decades ago. Finally, the property passed to the Lampugnani family of Milan and at the end of seventy years was acquired jointly by the Liguria Region and the Municipality of San Remo.

During the welcome, participants can visit the laboratories and greenhouses of our Institute.





## MONDAY APRIL 20:

### Guided tour in Sanremo and informal dinner together

<i>Start time:</i>	17.30
<i>End time:</i>	21.00
<i>Meeting point:</i>	Hotel Londra
<i>How to reach the meeting point:</i>	It is the symposium venue
<i>Price:</i>	Included for all registered participants and registered accompanying persons. A specification of the interest in this event should have been manifested at your arrival.

A guided tour of the city will be performed with particular attention to the “Pigna” (medieval quarter). Pigna is full of covered alleys, little squares, and terraced houses together with dull colors and long silences which in turn create emotions and sensations unknown to mass tourism.



The name of this area – Pigna – which comes from its curling up around the hill just like the scales in a pine cone. It was founded as a stronghold around the year 1000 and it was enlarged and strengthened up to the sixteenth century so as to protect it from pirates’ attacks.





We will visit the Cathedral of St. Siro, then we will enter into the old town, passing through little squares and “caruggi” to reach finally the belvedere of the Gardens Regina Elena, named by the queen of Montenegro who was a frequent guest of the Town of Flowers and responsible for the reconstruction after the earthquake of 1887 that destroyed Bussana Vecchia. From this overlook, you can see a spectacular view of the city, the port and the gulf of San Remo. We will visit the “fontanassa”, an old fountain, and the old palace belonging to the family Gentile-Spinola.



The visit will last around two hours and then we will reach the restaurant Yatch & Club-Sanremo, near the harbor, where we will have an informal dinner together. We will have the pleasure to listen the musician Claudia Murachelli who will play the Celtic harp for us.

**Claudia Murachelli** was born in 1985 in Sanremo where she lives. In 2006 she began her singing studies with the organist M<sup>o</sup> Fabrizio Brezzo from Taggia. She is a lyric soprano; together with the organist M<sup>o</sup> Fabrizio Brezzo she is singing opera songs and traditional hymns for weddings, ceremonies and classic concerts. In 2009 she began her celtic harp studies with the harpist M<sup>o</sup> Marcella Grossi from Imperia and she was in Ireland for a celtic harp stage with famous Irish musicians (like Grainne Hambly, Cormac de Barra, Paoul Dooley etc...). In 2013 she attended an harp stage with the paraguayan musician Ismael Ledesma. She sang and played harp also in the rock band LumiHiutale. She won different awards in confirmation of her talent and professionalism. It will be our pleasure to listen her music on the shores of the sea.







## TUESDAY APRIL 21:

### Drink and music together at Royal Hotel, Sanremo

<i>Start time:</i>	18.30
<i>End time:</i>	21.00
<i>Meeting point:</i>	Hotel Royal
<i>How to reach the meeting point:</i>	It is close to the symposium venue and it can be reached by 5 min walking from there.
<i>Price:</i>	Included for all registered participants and registered accompanying persons. A specification of the interest in this event should have been manifested at your arrival.

On Tuesday we will have the pleasure to sip our drinks listening the opera music. The Opera singer Antonella Banaudi will sing for us beautiful opera and chamber songs. The delicious locals of Royal Hotel will be the backdrop to this enchanting evening.



**Antonella Banaudi – soprano**



After graduating from the Verona Conservatory, Antonella Banaudi studied with Augusta Oltrabella, Lia Guarini, Leyla Gencer, Carlo Bergonzi, Antonio Tonini, Gabriele Pisani, Bob Kettelson and Luciano Pavarotti.

She had won first prize in a number of international voice competitions: *As.Li.Co*, *Maria Caniglia*, *Philadelphia Opera Company/Luciano Pavarotti*, *Voci verdiane/Busseto* and *Maria Callas* and also she had won prizes in the *Puccini/Milano* and *Giuseppe Verdi/Parma* competitions.

Besides her operatic engagements, she has appeared in many concerts, singing German Lieder and Italian chamber music. In 1983 she sang her debut in Antonio Vivaldi's opera *Il Farnace* at the Piccola Scala theater in Milan. In 1987 she sang the role of Gulnara in Verdi's *Il Corsaro* at the side of the famous tenor Carlo Bergonzi. She has sung with other great singers, including with Luciano Pavarotti in the title role of Verdi's *Luisa Miller* in Philadelphia, a production which was recorded by U.S. network TV. For the Maggio Musicale Fiorentino festival she sang Leonora in Verdi's *Il Trovatore*, conducted by Zubin Mehta, a production which was broadcast by the Italian TV network RAI, and was later issued by Decca as a CD and DVD.

In 1990 she won the Italian Opera magazine critics' prize, with the famous soprano Anita Cerquetti acting as her madrina (godmother). She has received favorable reviews from the London Opera magazine and from Metropolitan Opera News.

Antonella Banaudi has recorded for Swiss Radio, and with RAI made two premiere recordings of works by Franco Alfano and Ottorino Respighi. Along with bass Franco de Grandis she recorded a CD on the Denna label with the Royal Orchestra of Stockholm; and with tenor Nicolai Gedda, tenor Gösta Winbergh, and baritone Roberto Servile she recorded a CD with the St. Petersburg Orchestra on the Amadeus label.

In collaboration with the Italian Cultural Institute she has performed at various Italian embassies abroad, and has sung for the Schiller Institute in Paris, Rome, Milan, and Busseto, along with pianist Günter Ludwig, mezzo-soprano Viorica Cortez, baritone Renato Bruson, bass-baritone Ruggero Raimondi, tenor Carlo Bergonzi, and sopranos Mirella Freni and Renata Tebaldi, to promote the Verdi tuning of C=256 Hz (A=432 Hz). Her biography is included in the archives of the International Music Museum in London.



## WEDNESDAY APRIL 22:

### Symphony Orchestra Concert at Casino and gala dinner

<i>Start time:</i>	19.00
<i>End time:</i>	20.30 (concert); 23.00 (gala dinner)
<i>Meeting point:</i>	Casino theater (concert) and Roof Garden Restaurant (gala dinner)
<i>How to reach the meeting point:</i>	Casino is not far from the symposium venue, around 10 min walking.
<i>Price:</i>	The concert is included for all registered participants and registered accompanying persons. A specification of the interest in this event should have been manifested at your arrival.  The gala dinner costs 60 € and the participant should have specified his interest in the registration form.



**The Casino's building was designed by the French architect Eugène Ferret, opening the 12<sup>th</sup> of January of 1905.** Today, the Casinò of Sanremo owns one of the finest and most famous theatres of the Ligurian arch. It is an establishment that has witnessed, inside itself, the birth of the Italian Song Festival, and which is home to year-round theatrical performances, cultural and musical events. Events of high cultural interest take place at the theatre; like today's thirty years old "Literary Tuesdays", considered the cultural salon of western Liguria. Literary Tuesdays are carried out by Ito Ruscigni, who presents internationally renowned literary authors from October to June.



This beautiful theatre is also home of the Sanremo Symphony Orchestra, running an average of 100 concerts throughout the year. The structure has a sitting capacity of 400 seats from which 255 of these are located in the auditorium (two seats reserved for people with disabilities), the Gallery seats 99 people, while another 9 boxes are available. The stage width is 220 sqm; the audience with the stage extends to 260 sqm, the gallery and boxes reach 103sqm instead. The proscenium's height is 7 m.



The curtain wears the colours that are dear to the Casinò di Sanremo: gold at the bottom and a predominant red which also covers all seats contrasting against the yellow walls. At the very top lies the “Lion” a symbol of the city, whereas on the sides of the curtain, flower bases with fresh flowers are never lacking; it is a distinctive feature of the Riviera and of the city.

In 2001-2003 the theatre underwent a complete rework and furniture renewal in order to comply with modern safety regulations.



The Casinò of Sanremo features, among other services, a large restaurant called the Roof Garden, a beautiful terrace under the stars, covered and heated in winter where our gala dinner will have place.



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## **TECHNICAL TOURS**





## TOUR 1

### FLOROVIVAISTICA BARATTA S.S.



The company specializes in breeding program and nursery activities mainly addressed to carnation. The breeding activity has enlarged over the years by covering also other ornamentals: rose, pelargonium, ranunculus and daisy. This company covers about 3 hectares.

### ASSERETTO E GARIBALDI A & G FLORORTOAGRICOLA S.S.A.

The company was founded in 1973 and at the beginning was addressed to carnation, orchids and geranium. Nowadays, AG covers seven acres of land and has about 25 employees and is dealing with succulents and cacti for national and international markets.



### BIANCHERI CREATIONS



Biancheri Creations® specializes in the production, preparation and marketing of ranunculus and anemone bulbs. The varieties obtained through the breeding program carried out in the company and the application of micropropagation techniques are worldwide sold and appreciated.

### MICROALGHE CAMPOROSSO SOCIETA' AGRICOLA Srl [MAC]

The company was founded on November 5th, 2010, for microalgae farming. A biotechnological greenhouse is fitted with 500 mt long green wall panel photobioreactors; this is the first and biggest field sized photobioreactor farm in Italy. A wider greenhouse (almost one hectare) is being developed close to the first. Different microalgae species are currently being produced: Nannochloropsis, Isochrysis, Tetraselmis and Phaeodactylum. MAC is led by the Biotechnology research companies Archimede Ricerche srl and Fotosintetica and microbiologica, a spin-off of Florence University, thus benefiting of state-of-the-art microalgae knowledge and expertise, and shall be developed as the farming branch of Microalgae Research Center being designed by AeA Parodi Group in Camporosso.





## TOUR 2

### RAVIOLA ROBERTO AZIENDA AGRICOLA DI FLORICOLTURA

The company is addressed to produce aromatic plants in small pots which are offered in packs which can be offered as gift boxes, event decorations or simple and useful supplies for homemade flavours. The company is highly automated for all the production phases.



### AZIENDA FLORICOLA “C&G FLORICOLTURA” – CALLERI GEROLAMO E CLAUDIO

The company is dealing with different crops: plants under glasshouse requiring heating (phalaenopsis, poinsettias, basil in pots) and plants grown under field conditions (daisies, iberis). A biomass heating plant with zero emissions has been operating in the greenhouse since 2007.

### AZIENDA AGRICOLA RAVERA BIO

The company specializes in the production of aromatic plants under a biological approach. A wide assortment of certified aromatic plants are offered as well as edible flowers. All the packaging are realized with recycled and recyclable materials.



### .AZIENDA PESCE SERGIO

Sergio Pesce is a family company which has been in business for three generations. This company has 10 hectares of cultivation with a production of around 1 million of flowering pots. The range of products of the company covers daisies, lithodora, dianthus, lavandula stoechas, and many others. The products are offered as a bush, tree and basket.





## TOUR 3

### B& B BREGLIANO MAURA SANDRA E SILVIO SRL



Since 1960, B&B has worked as a supplier of flowers to wholesalers and chain-stores. The company has been working with more than 50 florist specialists and over 1 million bouquets are sold each season. The bouquets are composed of flowers and greenery selected primary from the area of Sanremo.

### AGRICOLTURA PICCIRILLI

The company was founded in 2005 and at the beginning was addressed to production of pea flowers (*Lathyrus odoratus*) for the international market, mainly for USA. Nowadays, the company has a wide range of crops, e.g. ranunculus, carnation, peony and rose berries which are cultivated under greenhouses with an automated control. Recently the company has started breeding programs and opened their interests towards vegetables.



### CACTUS MANIA



For over 35 years, Cactus Mania have been specialized in producing, importing and exporting cacti of every size, succulents, caudiformis, collector's pieces and related services. The farm is a leader in creating indoor and outdoor gardens. Participants could appreciate the expertise of the Cactus Mania team and visit the huge collections grown under the 10,000 squares meters of greenhouses.

### NIRP INTERNATIONAL

NIRP International is a worldwide leading Company in the field of research, breeding, selection and marketing of new cut rose and garden rose varieties. Established 40 years ago, Nirp has been able, over the years, to conquer a large market share thanks to a tradition made of professionalism and passion. Nirp varieties are highly appreciated on all the markets for their agronomical, aesthetical and commercial performances.





## **POST-SYMPOSIUM TOUR**



## POST-SYMPIOSIUM TOUR

To finish off our symposium, a **Post Congress Tour** will be organized on **Friday, April 24<sup>th</sup>**. On this day, you can come and enjoy the guided tour dedicated to **Genoa**, the capital of Liguria and the six largest city in Italy. We will discover the charm of the old town, the Europe's widest Historical Centre, through visiting the Old Harbour Area, the narrow streets "caruggi", the cathedral, palazzo Ducale and the Opera House Carlo Felice. Part of our tour will be dedicated to one of the most sumptuous residences built by the aristocratic Genoese families during the so called "Secolo d'Oro" (between the sixteenth and seventeenth century): "Palazzo Tobia Pallavicino" where today has its headquarters the chamber of commerce. These private palaces were transformed in a network of public hospitality houses, called Rolli, where kings, princes, diplomats, ambassadors were hosted during their state visits. The "Rolli" were declared a UNESCO World Heritage Site in 2006.



**We will travel by touristic bus from Sanremo to Genoa; departure time 7.00, estimated arrival time in Genoa 9.30 a.m.**



In Genoa we will have a lunch; the participants could taste the specialties of the Ligurian gastronomy such as "trofie al pesto", a traditional pasta dish, and will enjoy a demonstration in situ as it is prepared a true "pesto Genovese". After lunch we will have a cruise and we will reach **San Fruttuoso Abbey and Portofino**.

Firstly we will reach **San Fruttuoso Abbey** (cruise time: around 30 min). A Benedictine monastery, a pirates' den, humble home of fisherfolk and then, for centuries, the property of the princes Doria, the Abbey of San Fruttuoso is today an utterly unique place, where the work of man has been pleasingly integrated with that of nature. Set within a deep inlet in the Portofino



promontory, the Abbey is a pearl dating from the 10<sup>th</sup> to the 13<sup>th</sup> centuries, embellished with refined reuse of marble elements.



After a short visit of this magical place, we will cruise towards **Portofino** (cruise time: approx. 30 min) an Italian fishing village and upmarket resort famous for its picturesque harbor and historical association with celebrity visitors. We will visit the village and participants could buy crafts and typical products as a souvenir of our Region.



In the late afternoon we will cruise to Santa Margherita Ligure (cruise time: 15 min) and we will take the touristic bus back to Sanremo; the **arrival is previewed at around 20.30**.

It will be a day which will combine the Ligurian culture with relaxation. It will be an occasion to spend time with other participants and the organizing committee of 6<sup>th</sup> PEMP. We hope that it could be an unforgettable day!

Come and enjoy this marvelous day and don't miss it!

Additional information:

Cost: 75,00 €/participant

A minimum of 50 participants are required

We have set an alternative program in case of bad weather by replacing the cruise with visits to the different treasures in Genoa



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### 6<sup>TH</sup> PEMP SCIENTIFIC AWARD

- Endogenous cytokinin profiles of in vitro grown kohlrabi hypocotyl and seedling explants with their respective shoots regenerated via indirect organogenesis* [242](#)  
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- Comparison between a conventional culture system and Plantform bioreactor in Quercus robur micropropagation* [243](#)  
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**6<sup>TH</sup> PEMP SCIENTIFIC AWARD  
ABSTRACTS**



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## STUDENT AWARD

The Regional Institute for Floriculture (IRF, Sanremo), is an applied research institution aimed to promote, develop and coordinate innovation in the field of agriculture sector. This work is performed in close cooperation with the productive world and the researches are addressed to support the production chain with innovation transfer and sustainable management of floriculture crops. The institute offers new products and specialized services.

As a mean of promoting horticultural research and its practical application and with an eye to the young people entering in the field, **IRF has organized a scientific competition in the framework of the 6<sup>th</sup> PEMP.**

The competition was opened to PhD students and young researchers who have earned the PhD title for less than one year.

A Scientific commission with experts of the field was established in order to evaluate scientific quality, originality, topic significance and relevance of the submitted works. We are deeply in debt to each member of this commission for the provided assistance.

Results of the prize-awards:

### **Ćosić Tatjana**

Institute for biological research “Siniša Stanković”, Serbia

*Endogenous cytokinin profiles of in vitro grown kohlrabi hypocotyl and seedling explants with their respective shoots regenerated via indirect organogenesis*

### **Gatti Enrico**

University of Modena and Reggio Emilia – Department of Life Sciences, Italy

*Comparison between a conventional culture system and Plantform bioreactor in Quercus robur micropropagation*

### **Keshavarzi Marzieh**

Massey University – Institute of Agriculture and Environment, New Zealand

*Gentian “Little Pinkie” and the production of explants as influenced by ethephon and growth duration in vitro*

### **Michalec-Warzecha Żaneta**

Polish Academy of Sciences – The Franciszek Górski Institute of Plant Physiology, Poland

*Establishment of hairy root culture from Stevia rebaudiana Bertoni explants*

During the days of the symposium, the award winners will present a poster about their work and a short oral presentation will be provided.





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## **LIST OF PARTICIPANTS**



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