International Union of Forest Research Organizations

Union Internationale des Instituts de Recherches Forestières

Unión Internacional de Organizaciones de Investigación Forestal

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IUFRO Meeting Report Form

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1) IUFRO focal person & meeting organizer:

11) IUFRO focal person

Name: TRONTIN Jean-François

Affiliation: FCBA Technological Institute, France

Function in IUFRO: Coordinator, IUFRO 2.09.02 Working Party

Email: jean-francois.trontin@fcba.fr

12) Meeting Organizer

Name: SHARRY Sandra

Function and affiliation: Dean of the Faculty of Agriculture and Forestry Sciences (FCAyF), National University of La Plata (UNLP), Argentina

Email: ssharry@gmail.com

13) Conference Organizing Committee:

First name, SURNAME	Institution & country	Function
Sandra SHARRY	FCAyF-UNLP, Argentina	Organizer La Plata 2016, Argentina
Paloma MONCALEÁN	Neiker-Tecnalia, Spain	Organizer Vitoria 2014, Spain
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Heung-Kyu MOON	NIFoS, Republic of Korea	Organizer Suwon 2010, Korea 2.09.02 Deputy Coordinator (since 2008)
Mariano TORIBIO	IMIDRA, Spain	2.09.02 Deputy Coordinator (since 2008)
Yill-Sung PARK	NRC/CFS, Canada	2.09.02 Founder (2008) 2.09.02 Coordinator 2008-2014
Jean-François TRONTIN	FCBA, France	2.09.02 Deputy Coordinator 2008-2014 2.09.02 Coordinator (since 2015)

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2) Meeting report *(max. 100 words per paragraph)*

21) Key issues discussed/latest findings in the field:

SESSION 1	Strategies for integration of vegetative propagation into breeding programs in the context of global warming and associated stresses
SESSION 2	Towards multivarietal (or clonal forestry): environmental factors affecting vegetative propagation of trees
SESSION 3	(Epi)genomics of embryo or other vegetative propagule development
SESSION 4	Preservation and adaptation of wild and selected genetic resources to environmental and socio-economic changes
SESSION 5	Lessons from in vivo growth of vegetative propagules, especially in various pedoclimatic conditions
SESSION 6	Reducing socio-economic and environmental costs of plantation forestry

22) Conclusions *(if possible, summarize key conclusions across presentations):*

Abstract (max. 100 words)

The importance of plantation forestry was highlighted as forests are becoming increasingly fragmented and vulnerable in the context of both anthropic- and climate-related pressure. Flexible and popular, low-cost vegetative propagation methods are considered critical and well-suited (especially somatic embryogenesis) for both sustainable plantation forestry and conservation of genetic resources (breeding and wild populations from marketable or endangered, multipurpose native species). Application-oriented research efforts in close collaboration with breeders may allow the careful selection and cost-effective, rapid deployment (and turn-over) of elite varieties expressing natural or induced adaptation response (endophytes, mycorrhizal fungus, elicitors, genetic modification) to environmental stress.

*Extended abstract (across **oral** and **poster** presentations)*

The importance of plantation forestry (currently 7 % of the world's forested area) to cope with a changing climate was highlighted (**S. Galarco**, opening lecture). Range shifts, pole-ward migration, shifts in phenology, threat to biodiversity, extinction risks, increase in drought conditions, changes in precipitations, increase in sea level and increase in pest populations are main impacts of climate change (**M.R. Ahuja**, closing lecture). In this context, easy/accessible, flexible and popular vegetative propagation (VP) methods with reduced number of steps are needed worldwide (**G. Salvatierra, A. Masson, M.R. Ahuja**). VP is a requirement not only for forestry; i.e. to make easier and more efficient the transfer of genetic gains to commercial plantations and by-pass sexual limitations (**P.A. González/***P. Taeda;* **T. Benneckenstein**/hybrid larch; **C.D Vera Bravo**/*P. taeda* and hybrids**)**, but also for landscaping engineering towards healthy and aesthetic environment as the world is becoming more urban than rural (**L. Roussy**).

There is a need for more short term, application-oriented research to efficiently propagate selected genotype/varieties at the cheapest cost (**O. Monteuuis, G. Salvatierra, A. Masson, P.A. González, S. Suharyanto**) and with fulfillment of national guidelines and prevailing laws (e.g. regarding the marketability, **T. Benneckenstein**). Depending on both the species and end-uses, the best propagation strategy (i.e. seeds vs. VP technologies) must be considered in close collaboration with selectors/breeders. "Real breeding without breeding" can be achieved through the careful selection and propagation of natural resources (**S. Merkle/**white ash**, P. Rojas Vergara/**eucalypts).

VP of elite trees (i.e. with added value) expressing natural or induced defense/adaptation response to biotic/abiotic stresses is a key issue for increasing resilience of planted forests (**S. Galarco**, **I. Arrillaga**/oak, pine, **I. Trujillo**/banana; **K. Suganthi**/mangroves, **P. Rojas Vergara**/eucalypt; **J. González**/eucalypts). Micropropagation through axillary/adventitious budding or somatic embryogenesis (SE), more conventional VP methods (grafts, cuttings) or a judicious combination of both may help for efficient production at the cheapest cost of improved planting stocks (**O. Monteuuis**,

C. Hargreaves, **C. Reeves, P. Rojas Vergara, K.A. Högberg, D. Breton, P. Gupta, M.E. Aguilar**). The management of mini clonal gardens (production of cuttings from micropropagated mother plants) in nursery is one current large-scale technology for the cost-effective production of improved varieties of commercial interest (**R. Penchel**, eucalypts; **J. Schapovaloff**, *Pinus taeda*; **V. Rudoy**, blueberry, sugar cane). In radiata pine, hybrid tissue culture systems combining germinated somatic embryos with organogenesis (adventitious shoot formation) and/or cuttings production allowed the best aspects of the component propagation methods to be exploited (**C. Reeves**) for variety deployment, up to 2 million plants per year at approximate $900/1000 plants (**C. Hargreaves**). In *Hevea*, remarkably, the self-rooted cuttings production from *in vitro*-issued stock plants in nursery conditions is cost-effective and allowed to by-pass current limitations of micropropagation and grafting for deployment of industrial clones (**A. Masson**). Genotype-specific protocol development is required in species of commercial interest (**P. Gupta**/*Pinus taeda*, Douglas-fir; **D. Breton**/*Coffea*; **I. Trujillo**/banana; **N. González Cabrero**/Stone pine; **A. Masson**/*Hevea*; **J. Raschke**/larch, Douglas-fir, Nordmanns fir). In the frequent case of selected varieties that are recalcitrant to *in vitro* VP, systematic approaches based on the mineral nutrition status of young plant tissues may help to design genotype-specific fine-tuned basal media (**J. Oberschelp**/eucalypt).

Climate change is affecting the reproductive system of many species (flowering, seed development). Micropropagated plants, both through organogenesis (axillary/adventitious budding and adventitious rooting) and SE, can be used to study the development of selected genotype in specific environmental conditions (biotic/abiotic stress) and to identify candidate genes (**J.F. Martins, M.A. Lelu-Walter, I. Arrillaga, C. Sánchez, I.A. Montalbán**). SE has been demonstrated (molecular physiology) to be a good *in vitro* model (controlled conditions) of early zygotic embryo (ZE) development stages (**M.A. Lelu-Walter**/conifers). The identification of genes and gene networks (and related expression profiles) playing key roles during acquisition of embryogenic competence and embryo development (both SE and ZE) in different environmental conditions may help to develop seed-based propagation strategies and to refine SE protocols for producing high-quality SE plants similar to the zygotic reference. Various genes and proteins involved in key processes (auxin-mediated pathways, stress-related genes, putative epigenetic regulators such as miRNA, cell-to-cell trafficking, *etc*.) have been highlighted (**M.A Lelu-Walter**/larch, pine, **J. Canhoto**/tamarillo, radiata pine, **S. Correia**/tamarillo, **C. Miguel**/maritime pine; **B. Navarro**/*Araucaria*, **A. Wójcik**/*Arabidopsis*) after genomic profiling of tissue with different embryogenic potential. Fluorescence-activated cell sorting (FACS) is useful for transcriptome profiling of differentially expressed genes in very specific and localized cells (**S. Correia**/tamarillo). Interestingly most miRNA are themselves targeting other key regulators such as transcription factors (**C. Miguel**/maritime pine; **A. Wójcik**/*Arabidopsis*). Specific studies of some epigenetic marks (DNA methylation) confirmed that methylation-sensitive markers could be polymorphic in relation to culture conditions (temperature, water availability) during SE proliferation (**N. González-Cabrero**/stone pine). Temperature and/or water availability were shown to affect initiation rate and embryo development in radiata, halepo and maritime pines (**I. Montalbán, M.A. Lelu-Walter, I. Arrillaga**). Similar pathways such as the auxin-mediated regulatory pathways are equally important during adventitious rooting and some genes are good candidates for a role in establishing the required auxin gradient for inducing the root initiation process (**C. Sanchez**/chestnut).

In most species, somatic embryogenesis is only obtained from juvenile explants and protocol refinements are needed to increase initiation rate (**J. Degenhardt-Goldbach**/*Pinus caribaea*; **P. Boeri**/*Melia azedarach*, *Prosopis alpatac),* maintain embryogenic potential (**F. Gautier**/Douglas-fir) and achieve high-quality plants with zygotic-like features. Some current issues are to reduce the frequency of abnormal embryos (**M. Quoirin**/palm tree; **B. Navarro**/Araucaria; **L.F.D. Oliveira**/*Araucaria*), to increase embryo maturity (**M.A. Lelu-Walter**/maritime pine; **P. Gupta**/*Pinus taeda*), to improve light spectrum and reduce associated stresses (**K. Eliášová**/ Norway spruce, UV-B; **S. Varis**/Norway spruce, LED light system; **S. Merkle**/chestnut, hemlock, red light) and to develop adapted support/plugs and controlled growth conditions (including fertilization) for conversion to *ex vitro* conditions (**YW Kim**/larch; **D. Breton**/*Coffea*; **F. Avilés**/*Pinus radiata*).
SE initiated from mature, selected trees would be a paradigm shift for clonal forestry especially to reduce the development cost of new varieties. Significant achievements were obtained in hardwoods/angiosperms (**I. Trujillo**/banana; **D. Breton**/coffea; **A. Masson**/Hevea; **V. Cano**/holm oak; **J.A. Kim**/*Prunus serrulata*) but conifer species are still highly recalcitrant (**S.P. Rocha**/*Pinus taeda*). Interestingly, SE induction protocol successfully applied in primordial shoots of white spruce somatic

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plants up to 10 years old (Klimaszewska et al. 2011, Planta 233: 635–647) was successfully used to initiate embryogenic lines in Norway spruce SE plants that are 3-4 years old (**S. Varis**).

When routine protocols are available, strong selection effects are still observed during the whole SE process, i.e. lines are lost at every steps until acclimatization (**K.A. Högberg**/Norway spruce; **C. Reeves**/*Pinus* spp.). When established in field conditions, initial growth is consistently reduced compared to control seedlings (**K.A. Högberg**/Norway spruce; **T. Aronen**/Scots pine; **M.-A Lelu-Walter**/maritime pine) and may be linked with partial embryo maturity at the time of harvesting (**M.A. Lelu-Walter**/maritime pine). However it is difficult to synchronize the development of somatic seedlings and control seedlings and more appropriate controls may be developed such as standard lots of somatic seedlings (**T. Aronen**). No selection effect was observed for flushing (**K.A. Högberg**/Norway spruce) and yearly growth of SE could be similar to that of seedlings (**T. Aronen**/Scots pine). Moreover, good phenotypic conformity of SE plants was observed in large field trials established at different locations (**J. Find**†/*Abies nordmanniana*; **P. Gupta**/*Pinus taeda*). Interestingly, clonal selection for resistance to insects or diseases may be possible from such field experiments (**J. Find**†/Abies; **T. Aronen**/Scots pine). Registration process of SE lines for commercial forest plantation is being to be implemented in Finland (**M. Tikkinen**/Norway spruce). Registration is possible for both untested material (SE lines from high value parent trees for bulk propagation) or as qualified/tested material (combination of 4-11 clones with proven breeding values).

In other well-established VP systems such as production of cuttings/minicuttings from stoolbeds in poplar (**C. Graciano**), fertilization (N or P) affects relative development of roots and sprouts as well as wood density but not early vigor of cuttings. Fertilization can reduce tolerance to drought (N) or temporary flooding (P). Nutritional requirements were equally important in *Toona ciliata* (**T.P.F. Oliveira**). Hormone concentration in young apical leaves has been associated with appropriate adventitious rooting (**P. Reyes Torres**/*A. perutilis*). *Ex vitro* rooting could be more efficient and cheaper than *in vitro* rooting (**C. Hargreaves**/*P. radiata*; **S. Suharyanto**/*Acacia crassicarpa*). When VP technologies are sufficiently refined to deploy selected clones in the field (**R. Aggangan**/native species/cuttings; **J.F. Trontin**/eucalypt hybrid/cuttings from micropropagated plants through axillary budding), productivity was shown as for conventional varieties to be affected by major pedo-climatic conditions such as soil water availability and fertility, as well as rainfall.

There are rapid increases in the number and scale of menaces to forest trees in many parts of the world (**S. Merkle, M.P. Guerra**). Low-cost biotechnological approaches are developed to assist domestication and conservation strategies of both exotic and native, rare ornamental form or multipurpose tree species (**F. Niella, M.P. Guerra, M.A. Basiglio, P. Boeri, H. Mattes, N. González-Cabrero, A.I. Putri, P. González; L. Koch, L.E. Taccari, J.C. Araujo Vieira de Souza, G. Campos Mamede Weis de Carvalho, E. Duarte, T. Nikkanen, I. Trujillo, R. Aggangan**). Forest are becoming increasingly fragmented (loss of habitat) and vulnerable (loss of genetic diversity, insect pests, pathogens, abiotic stresses). Conservation issues are critical in Latin America, especially Brazil, the richest megadiverse country in the world (**M.P. Guerra**). Native, indigenous forest tree species can have high potential but are usually difficult to propagate through seeds outside their natural habitat and *in vitro* VP/SE are therefore needed (e.g. **S. Werbrouck**, *Melia volkensii* in Kenya, eastern Africa, a semi-arid region highly affected by climate change). Conservation of genetic resources and selection/breeding of resistant/tolerant varieties could be greatly enhanced by employing *in vitro* VP systems. SE, in particular, is well-suited for this purpose, due to the high multiplication rates and the amenability of embryogenic cultures to cryostorage (**S. Merkle, M.R. Ahuja, S. Correia**). Various cryopreserved collections have been successfully established using SE in threatened species such as chestnuts (blight), hemlocks (woolly adelgid), ashes (emerald ash borer), and Atlantic white cedar (overcutting) (**S. Merkle**).

For commercially important species, a general trend to achieve cost-effective, rapid deployment of clonal varieties (i.e. at similar cost than reference seedlings) is to develop efficient technologies for scaling-up (production of million micropropagated plants/year) such as RITA® and other temporary immersion systems (**M.E. Aguilar**,/coffea, *Gmelina*, teak; **M.P. Guerra**/Peach palm; **R. Penchel**/eucalypts; **S. Merkle**/chestnut; **V. Rudoy**/sugar cane; **P. Gupta**/Douglas-fir; **G. Salvatierra/**eucalypts; **E. Tapia**/cherry; **T. Aronen**/Norway spruce), and/or liquid phase in disposable bioreactors (**D. Breton**/coffea; **P. Gupta**/*Pinus taeda*; **T. Maruyama**/*Pinus thunbergii*).

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Such systems are amenable to photoautotrophic conditions to produce healthier and better-adapted plantlets to acclimatization (**R. Penchel/**eucalypt; **N. Vidal**/chestnut). Main risks to address for successful scaling-up include malformation and contaminations, alteration of bioreactor structure after multiple manipulations, limitation of robotics for harvesting, sorting/quality assessment, planting/transplanting of million plants, the need for customized plant biofactory (indoor vertical high-throughput clonal gardens) and/or greenhouse facilities and, may be more importantly, business expectations. Typically, a facility to produce 4 million plants/year is estimated to be a 2 million $ investment (**R. Penchel**/eucalypts).

When both high-quality embryos/plants and production scaling-up is achieved with high efficiency for the SE technology, manufactured, artificial seeds appeared to be the ultimate, versatile technology (fit well existing systems for managing seeds and seedlings) for a high degree of automation and reduced cost/plant for the production of new varieties (**J. Find**†/*Abies*, **P. Gupta**/*Pinus taeda*).

Increased resilience of selected varieties can also be obtained more directly through genetic transformation or induced defense/adaptation through genetic/epigenetic mechanisms (resistance genes) or inoculation with natural symbionts (**I. Arrillaga, M.R. Ahuja**).
Natural symbiont microorganisms (endophytes, bacteria or fungus) could be identified and successfully used to confer protection against pathogens after inoculation during micropropagation (**J. Martins**/chestnut/ink disease). Similarly arbuscular mycorrhizal fungi inoculated just before acclimatization greatly improve survival and growth of SE-derived plantlets (**N. Aggangan**/*Kalopanax*, *Liliodendron*). The *in vitro* induction of epigenetic changes to elicit defense response is another ongoing strategy to increase plant resistance to specific pathogen. Various elicitors are currently tested in holm oak SE lines (e.g. paraaminobenzoic acid) to tentatively obtain resistance to *Phytophtora cinnamomi*/oak decline syndrome (**N. González-Cabrero, I. Arrillaga**).
Genes can be introduced by direct genetic modification in somatic embryos of selected genotypes with the final objective to produce transgenic plants with improved properties such as resistance to environmental stress (**M.R. Ahuja**/poplar; **I. Arrillaga**/oaks, pines, **P. Rojas Vergara**/*Eucalyptus globulus*; **C. Hargreaves**/radiata pine, **J.F. Trontin**/maritime pine; **T. Maruyama**/Japanese pines & cypresses, **M. Blasco**/*Pinus pinea*). Clonally replicated genetically-modified (GM) trees can be easily tested in different field conditions through assisted migration to pole-ward location (frost tolerance) or in drier climate (drought tolerance) (**M.R. Ahuja**). Pest-resistant GM poplar have been released in China, frost-tolerant eucalyptus and *Pinus taeda* engineered for increased wood density are expected to be released in USA (**M.R. Ahuja**). Overexpression of genes encoding pathogenesis-related (PR) proteins such as thaumatin-like proteins (antifungal properties) is a strategy tested in cork and holm oaks that are decimated by the oak decline syndrome (**V. Cano**).
More generally SE can be efficiently used as an enabling technology for reverse genetics (**J.F. Trontin**/maritime pine) through *Agrobacterium*-mediated genetic transformation for up/down regulation of candidate genes in whole plants. Genome profiling (transcriptomics/proteomics) is however required to identify suitable transgenic lines for further phenotypic analysis. Using such first-generation strategies for genetic modification, transgene instability/silencing and off-target, pleiotropic effects could be detected owing to variable transgene position in different lines. As a result it is required to screen multiple lines and to produce multiple plants in order to detect putative target effects of transgene expression. Next generation tree biotechnologies and particularly genome editing (such as CRISPR/Cas9) may allow site-directed mutagenesis at reduced cost (**M.R. Ahuja, J.F. Trontin, T. Maruyama, S. Werbrouck**). Proliferating embryogenic cells may be particularly amenable to genome editing in whole plants as single embryogenic cells or and/or very immature embryos are usually targeted in such embryogenic cultures (**J.F. Trontin, M.R. Ahuja**).

23) Outlook to future activities *(proceedings, future meetings, other):*

231) Proceedings: As for previous IUFRO 2.09.02 meetings (Suwon 2010, Brno 2012, Vitoria 2014), proceedings of the La Plata 2016 conference will be edited by Yill-Sung Park and Jan Bonga (Canadian Forest Service) and published online by mid-2017 at the IUFRO 2.09.02 conference website and dedicated IUFRO webpage for presentation of the Unit. Proceedings are considered to be the main way to disseminate the work of the working group with the appropriate form.

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232) Future conference: the 5th IUFRO 2.09.02 Conference will be organized by Jorge Canhoto and Sandra Correia (University of Coimbra) in Coimbra, Portugal during September 10-15, 2018.

24) Background information *(meeting context following the conclusions of Vitoria 2014):*

Global warming and climatic-related environmental changes are central preoccupations in current breeding programs. Vegetative propagation of improved varieties is expected to be a critical and flexible tool to maintain the productivity in plantation forestry, balancing genetic gain with environmental and socio-economic considerations. Multivarietal/clonal forestry "revival" is expected in conjunction with ongoing development of genome-wide approaches for selecting elite varieties. There are also strong synergies of vegetative propagation, especially somatic embryogenesis, with enabling technologies for efficient preservation, adaptation and deployment of varieties. Conference objectives fall into the current IUFRO Research Theme 2, "Forests and Climate change", especially the "Mitigation and adaptation strategies" emphasis area.

3) Other information:

31) Meeting data:

311) Full title of the meeting: Development and application of vegetative propagation technologies in plantation forestry to cope with a changing climate and environment

312) Date and venue: September 19-23, La Plata, Professional Council of Economic Sciences, Province of Buenos Aires, Argentina

313) Meeting website: http://www.iufro20902.org/

314) Number of participants:

114 attendees: 106 scientists + 8 additional members of the Local Organizing Committee

135 participants overall: 114 attendees + 21 people that were unable to attend but who contributed to the Organizing Committee (4), the Scientific Committee (11), the student's competition (2) or were recognized as Honorees during the conference (4).

315) Countries represented:

114 attendees from 27 countries (Europe: 11; Latin America: 8; Asia/Oceania: 6; North America: 1, Africa: 1).

135 participants from 32 countries (Europe: 13; Latin America: 9; Asia/Oceania: 7; North America: 2; Africa: 1).

316) Number of presentations: 99

Key invited speakers: 6
Invited speakers: 24
Selected speakers: 21
Poster presentation: 48

The poster sessions offer an excellent opportunity to network with colleagues and establish connections and collaborations. In order to make the poster sessions more effective, a "Poster Introduction Session" has been organized in addition to normal poster viewing sessions. During this oral plenary session (Sept. 20, 16:00-18:00), the presenting authors had the opportunity to briefly introduce their poster and highlight one main result briefly (2 slides).

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317) Institutional representation during the meeting (106 scientists)

Public institutes/organization/university: 50 from 24 countries
⇨ Argentina (13), Brazil (6), Spain (4), Chile (3), Finland (2), France (2), Philippines (2), Portugal (2), Belgium (1), Colombia (1), Costa Rica (1), Czech Republic (1), Denmark (1), Ecuador (1), Germany (1), India (1), Indonesia (1), Japan (1), New Zealand (1), Poland (1), Republic of Korea (1), Sweden (1), USA (1), Venezuela (1)

Private organization/companies: 17 from 10 countries
⇨ Argentina (4), Brazil (3), Chile (2), France (2), UK (1), Mexico (1), Indonesia (1), Portugal (1), Swiss/Ivory Coast (1), USA (1)

32) Organization of the meeting:

321) All IUFRO Units involved: 2.09.02 (Somatic Embryogenesis and Other Vegetative Propagation Technologies)

322) Host organization(s) and sponsor(s):

The conference was co-hosted and funded by:

- the Faculty of Agriculture and Forestry Sciences (FCAyF, Facultad de Ciencias Agrarias y Forestales) of the National University of La Plata (UNLP, Universidad Nacional de La Plata, Argentina), http://www.agro.unlp.edu.ar.
- the Center for Forest Research and Extension Andean Patagonian (CIEFAP, Centro de Investigación y Extensión Forestal Andino Patagónico, Argentina), http://www.ciefap.org.ar
- and, for the third time (after Suwon 2010 and Vitoria 2014), by the NIFoS, Korea Forest Service (Republic of Korea), http://english.forest.go.kr

The Ministry of Science, Technology and Productive Innovation (MINCyT, Ministerio de Ciencia, Tecnología e Innovación Productiva, Argentina) and UNLP also provided direct funding support to this conference.

Additional supporting organizations (staff, organizational and/or funding support): FCBA (France), IMIDRA (Spain), Neiker-Tecnalia (Spain), University of Oulu (Finland), NRC/CFS (Canada) and IUFRO (SPDC Scientist Assistance Program).

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- Dr. Sandra Sharry (Dean of FCAyF-UNLP)
- Lic. Raúl Aníbal Perdomo (President of UNLP)
- Dr. José Daniel Lencinas (Director of the CIEFAP)
- Dr. Nam Sung Hyun (Director General of NIFoS)
- Minister Dr. Lino Barañao and Dr. Alejandro Mentaberry (MINCyT)
- Minister Ing. Leonardo Sarquís (Ministry of Agroindustry, Province of Buenos Aires)

323) Study tour(s) to: Nursery "Charles Darwin", Pereyra Iraola Park, Province of Buenos Aires, Argentina (September 23 afternoon). Visit by S. Galarco, Forest Director of the Province of Buenos Aires. Pereyra Iraola Park (ca. 10 000 ha) has been declared "Biosphere Reserve" in 2008 by UNESCO. Up to 1 million plants/year are produced at the nursery (eucalyptus, willow, ash, sycamore, Tilia, Catalpa, Albizia …) for plantation in either rural zone (plantation forestry) or urban/peri-urban

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environments (landscaping engineering). Various native trees have strong interest for wood/biomass production or as ornamentals in Argentina, e.g. *Cedrela* spp. (*Meliaceae*), *Ceiba chodatii* (*Bombacaceae*), *Schinopsis balansae* (*Anacardiaceae*), *Jacaranda mimosifolia* (*Bignoniacées*), *Salix humboldtiana* (*Salicaceae*), *Erythrina crista-galli* (*Fabaceae*), *Austrocedrus chilensis* (*Cupressaceae*), *Araucaria araucana* (*Araucariaceae*), *Enterolobium contortisiliquum* (*Fabaceae*), *Nothofagus pumilio* (*Nothofagaceae*), *Handroanthus impetiginosus* (*Bignoniaceae*), *Prosopis alba* (*Fabaceae*).

324) Satellite workshops

- September 19 (FCAyF-UNLP, 14:00 – 16:00): "*Innovation and challenges in the forestry sector*", chaired by Sandra Sharry. Public access (especially to students) with Spanish translation. Presentations from C. Hargreaves (Scion, New Zealand), P. Gupta (Weyerhaeuser, USA), R. Austin (Arauco Argentina), I. Montalbán (Neiker-Tecnalia, Spain) and V. Jara Rodríguez (Forestal Mininco). 58 participants.
- September 21 (Council of Economic Sciences, 17:00 – 19:00): "*Current status and prospects of vegetative propagation technologies in Argentinean Patagonia*", Chaired by Maria Laura Velez & Javier Grossfeld (CIEFAP, Argentina) with presentations from Patricia Boeri (National University of Rio Negro, Argentina) and Hernán Mattes (University of Comahue, Argentina). It was discussed the collaboration and mutual coordination of programs/projects of common interest (exotic and native trees) between laboratories of Patagonia and leading researchers worldwide. About 30 participants.

33) Communication activities

331) Dissemination of information about the meeting:

- IUFRO 2.09.02 mailing list: currently 742 members (341 affiliations, 65 countries). Eight announcements – J.-F. Trontin (FCBA dedicated tool).
- IUFRO Division 2 mailing list + IUFRO 2.09.02 virtual address book. Eight announcements – B. Burger, J.-F. Trontin.
- IUFRO 2.09.02 webpages (http://www.iufro.org/science/divisions/division-2/20000/20900/20902/) and IUFRO meeting calendar - J.-F. Trontin, B. Burger.
- IUFRO 2.09.02 permanent Conference website (http://www.iufro20902.org/) – Y.-S Park (English site hosted by Canadian Forest Service), S. Sharry & E. Moreno (Spanish webpages linked to the English website, http://www.iufrolaplata2016.com.ar/).
- XYLOBIOTECH website (http://biotech.xyloforest.org/) – J.-F. Trontin. XYLOBIOTECH is a technical facility (XYLOFOREST plateform, http://www.xyloforest.org/) located at both FCBA and INRA Orléans (France) dedicated to biotechnologies of forest trees including vegetative propagation technologies (Coordination J.-F. Trontin).
- InfoSylva (May 2016) – S. Sharry, J.-F. Trontin.
- Noticias de Bosques y Maderas (May 2016) – S. Sharry, J.-F. Trontin.
- IUFRO Genomics and Forest Tree Genetics Conference, May 30 – June 3, Arcachon, France Participation of J.-F. Trontin to the scientific program and dissemination of the Conference Brochure to participants.

332) Promotion of IUFRO:

1) *Presentation of IUFRO*, "The Global Network for Forest Science" (17 selected slides from the official IUFRO presentation). Trontin J.-F. (September 20, 2016, 9:10 – 9:50), Introduction of the Conference and Sessions (oral).
2) *IUFRO and students*: young scientists are a priority for the IUFRO 2.09.02 Unit and La Plata 2016 was the opportunity to organize the Second Biennial Student's Scientific Competition chaired by Dr. Mariano Toribio (IMIDRA, Spain). The selected competition themes were "*Advances in vegetative propagation technologies*" and "*Application of somatic embryogenesis in tree breeding and biotechnology*". The winner, João Filipe da Silva Martins (Portugal) has been invited to present his work during the conference with full support. All 5 runners-up were

invited to contribute to the scientific program and make an oral presentation (Kanagaraj Suganthi, India; Anna Maria Wójcik, Poland) or a poster presentation (Giovanna Campos Mamede Weiss de Carvalho, Brazil; Evelyn Raquel Duarte, Argentina; Taiane Pires de Freitas de Oliveira, Brazil). Airfare support could be provided to Anna Maria Wójcik. Special thanks and congratulations were provided to all five candidates (Award Certificate) during the Gala dinner (J.-F. Trontin and S. Sharry, September 21).

3) *IUFRO and special program for development of capacities*: Through its SPDC Scientist Assistance Program, IUFRO provides support to early/mid-career scientists from economically disadvantaged countries to attend the Conference and contribute to the scientific program. For La Plata 2016, IUFRO support was provided to Mrs Kanagaraj Suganthi (India) as an excellent runner-up of the Student's competition fulfilling all the selection criteria of the IUFRO-SPDC programme.

34) Business meeting (September 22, 16:00 – 17:00)

341) La Plata 2016 Conference Proceedings: to speed-up the process, it was decided (as for previous conferences) to publish the Proceedings online at the 2.09.02 conference website and not in the form of a special issue in a journal (although we received 2 proposals from *The International Forestry Review* and *Forest*). There will be three categories of manuscripts accepted for review: full paper, extended abstract, and short abstract. Both oral and poster presentations may be written for any of the three categories. The Proceedings will be edited by Drs. Yill-Sung Park and Jan Bonga (NRC/CFS, Canada) by mid-2017 (June). The deadline for submitting manuscripts is January, 31, 2017.

342) IUFRO 2.09.02 conference website: it was decided that the website currently hosted by the Canadian Forest Service (Canada) and updated by Yill-Sung Park will be progressively transferred and then permanently hosted by FCBA. Ian DeMerchant from the IT Service of the Atlantic Forestry Centre (Team Leader, Knowledge Synthesis Group, NRC/CFS) will keep active the current website until FCBA is ready to activate the new one (2017).

343) Next IUFRO 2.09.02 Conference: after a presentation of the project by Jorge Canhoto and Sandra Correia (University of Coimbra), it was decided to organize the next meeting in Coimbra, Portugal (September 10-15, 2018).

344) IUFRO 2.09.02 Coordination: J.-F. Trontin announced that Dr. Mariano Toribio (IMIDRA, Spain) and Dr. Heung-Kyu Moon (NIFoS, Republic of Korea) are already or will soon retired and would like therefore to resign from their responsibilities of IUFRO 2.09.02 Deputy Coordinators. Following the kind suggestions of Dr. Toribio and Dr. Moon, it was decided to propose the Deputy Coordination to Dr. Paloma Moncaleán (Neiker-Tecnalia, Spain) and Dr. Yong-Wook Kim (NIFoS, Republic of Korea). They both accepted the responsibility of Deputy Coordinator during the meeting and obtain the support of their respective Organization.

35) Recognition of scientists by the IUFRO 2.09.02 Working Party

The IUFRO 2.09.02 Unit is proud to organize during each conference some recognition of distinguished colleagues considering their high expertise and exemplary career and significant (sometime pioneering) contribution in vegetative propagation of trees. We think it is of prime importance to recognize outstanding contributions and scientific endeavors and ensure some intergenerational exchanges and "cultivate" a collegial spirit in our Working Party.

Our Honorees during previous conferences were:

Drs. Antonio Ballester (Spain), Jan Bonga (Canada), Vladimir Chalupa (Czech Republic), Don Durzan (USA), André Franclet[†] (France), Inger Hakman (Sweden), Pramod Gupta (USA), Krystyna Klimaszewska (Canada), Heung-Kyu Moon (Republic of Korea), Yill-Sung Park (Canada), David Thompson (Ireland), Ana Vieitez (Spain), and Sara von Arnold (Sweden).

Thank you very much for your kind cooperation!

During La Plata 2016 (Gala Dinner, September 21), it was the opportunity for the 2.09.02 coordination team and Organizing Committee (represented by J.F. Trontin, J. Krajňáková and S. Sharry) as well as the whole 2.09.02 membership to express recognition of the Unit to Drs. M. Raj. Ahuja (USA), Jenny Aitken (New Zealand), William J. Libby (USA), Gale H. McGranahan (USA), Scott A. Merkle (USA), Gerald S. Pullman (USA), Marguerite Quoirin (Brazil) and Mariano Toribio (Spain).

Some information about the whole career of honorees were collected by P. Moncaleán, M. Toribio and J.F. Trontin. Recognition was expressed by J.-F. Trontin with the kind assistance of S. Sharry (and her wonderful team) and P. Gupta (one of our previous honorees) during the Gala Dinner (Central Hall, Building of Presidency, La Plata University). A recognition plaque in native wood was offered to each recipient during the Gala Dinner (M.R. Ahuja, S. Merkle), the conference (M. Quoirin) of by regular mail (J. Aitken, W.J. Libby, G.H. McGranahan, G.S. Pullman and M. Toribio).

36) Related publications /websites:

Abstract book: available to participants during the conference as a hard copy. Available post-conference as a full pdf copy.

Conference Proceedings: freely available by mid-2017 at the 2.09.02 conference website (http://www.iufro20902.org/) and also at the dedicated IUFRO 2.09.02 webpages (http://www.iufro.org/science/divisions/division-2/20000/20900/20902/).

37) Obituary: Jens Iver Find (University of Copenhagen, Denmark)

Our colleague Jens I. Find, member of the IUFRO 2.09.02 Working Group, suddenly passed out in early December 2016, a few weeks after his participation as an Invited Speaker to La Plata 2016 where he made an oral presentation about "results from the first full rotation of growth in clonal field trials of nordmanns fir (Abies nordmanniana)".

Jens got his PhD in 1997 from the Botanic garden, University of Copenhagen. After a post-doc (1997), he became an Associate Research Professor (1999-2000, 2004-2009) and Head (2000-2001) of the Tissue Culture laboratory, Botanic garden, University of Copenhagen. He spent previously much time as a researcher at the Department of Tissue Culture and Molecular Genetics (1997-1998, 2001-2004) and also as a member of the management team at the CellWall Biotechnology Centre (2003-2004), Forest Research/Scion, New-Zealand.

Since 2009, Jens was Associate Professor at the Natural History Museum of Denmark (SNM) and Head of the Tissue Culture Laboratory at IGN (Forest, Nature and Biomass, Department of Geosciences and Natural Resource Management), University of Copenhagen, Denmark. He was also Administration Head of ScienceLab and coordinator of the establishment of common laboratory facilities at SNM for zoology, geology, botany and the National Facilities - ScienceLab.

Jens' research was focused on plant physiology and development of methods for in vitro propagation of a large variety of different plant species. An area of special interest was the development of methods for clonal propagation of conifers by somatic embryogenesis (SE), especially Nordmanns fir (Abies nordmanniana) and Sitka spruce (Picea sitchensis) as model species but he was also involved in projects on other conifer- and angiosperm species. The SE systems in conifers was used as the basis by Jens' lab for investigation of epigenetic effects and for development of advanced tissue culture methods such as protoplast cultures, in vitro fertilization (IVF), treachery elements, reprogramming/rejuvenation of mature tissue, and genetic transformation of conifers. He was currently investigating the possibility of selecting cell lines with special focus on organic farming of Christmas trees. Jens was testing the Nordmanns fir SE system in commercial scale by production of plants for clonal field testing and by production of large quantities of plants from selected cell lines. Jens reported during the conference that SE trees were accepted recently for organic production with perspectives for 500 new clones tested each year and setting-up of large scale production facility for 50.000 plants/year/selected clone.

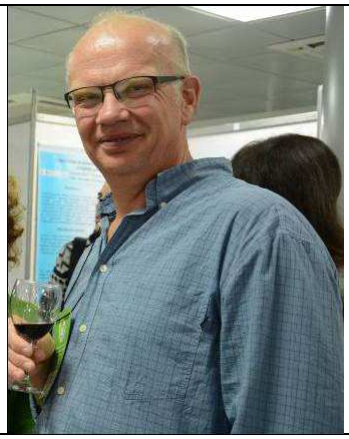
Thank you very much for your kind cooperation!

Our IUFRO 2.09.02 Unit wishes to emphasize the outstanding contribution and scientific endeavours of Jens I. Find in the vegetative propagation of trees, especially somatic embryogenesis in conifers and scaling-up the process in commercial scale.

Our Unit lost a Great Scientist and, even more importantly, a Friend. Jens was highly and unanimously appreciated for his kindness and so generous nature.

On behalf of all members of our IUFRO 2.09.02 Unit (currently 742 scientists from 65 countries worldwide), and with a very heavy heart, we would like to express all our sympathy to his close family.

Jean-François Trontin, Coordinator, IUFRO 2.09.02

Jens I. Find *During the 4th IUFRO 2.09.02 Conference* *La Plata, Argentina, Sept. 19-23, 2016*	

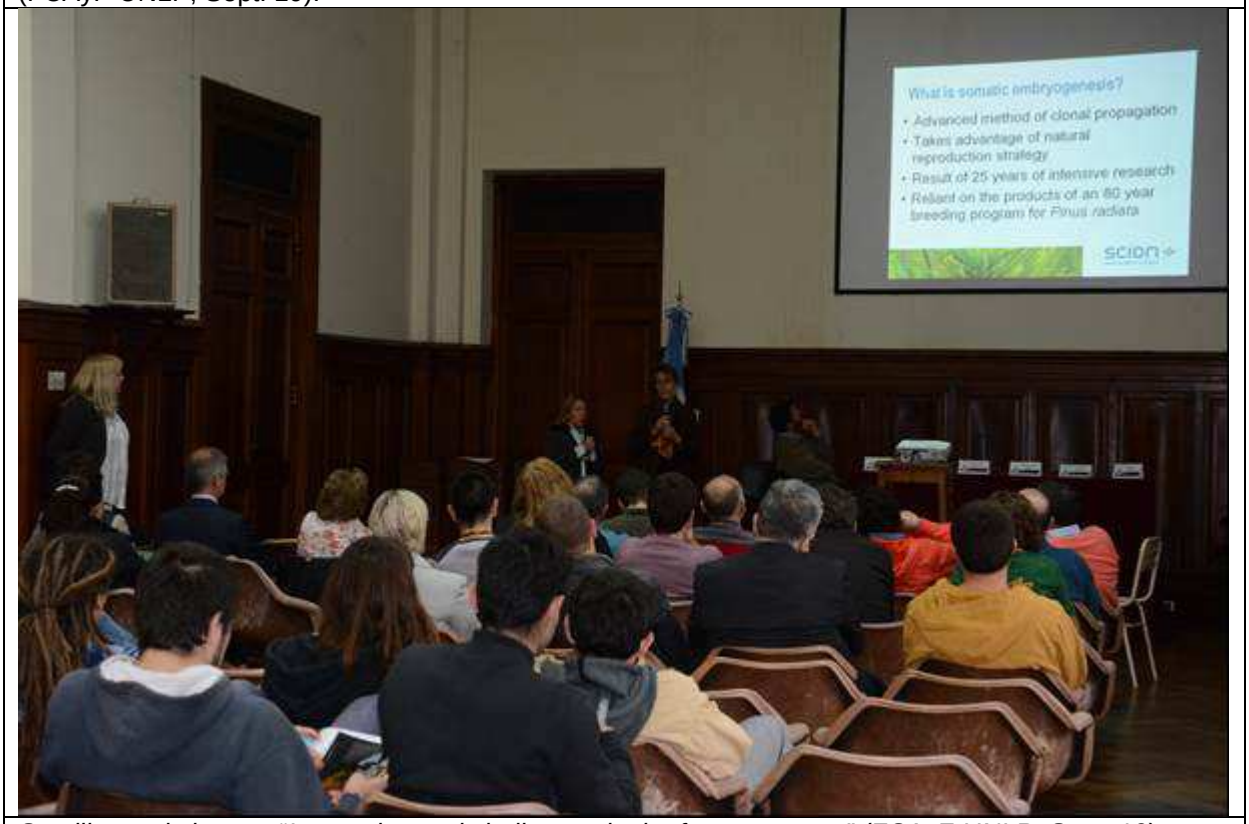
4) Selected photos

See the following link for a photo gallery::
https://drive.google.com/drive/folders/0B4zGrr4qaTOibEtHbk5lVEdaa28?usp=sharing

Copyright (all photos): University of La Plata (UNLP)

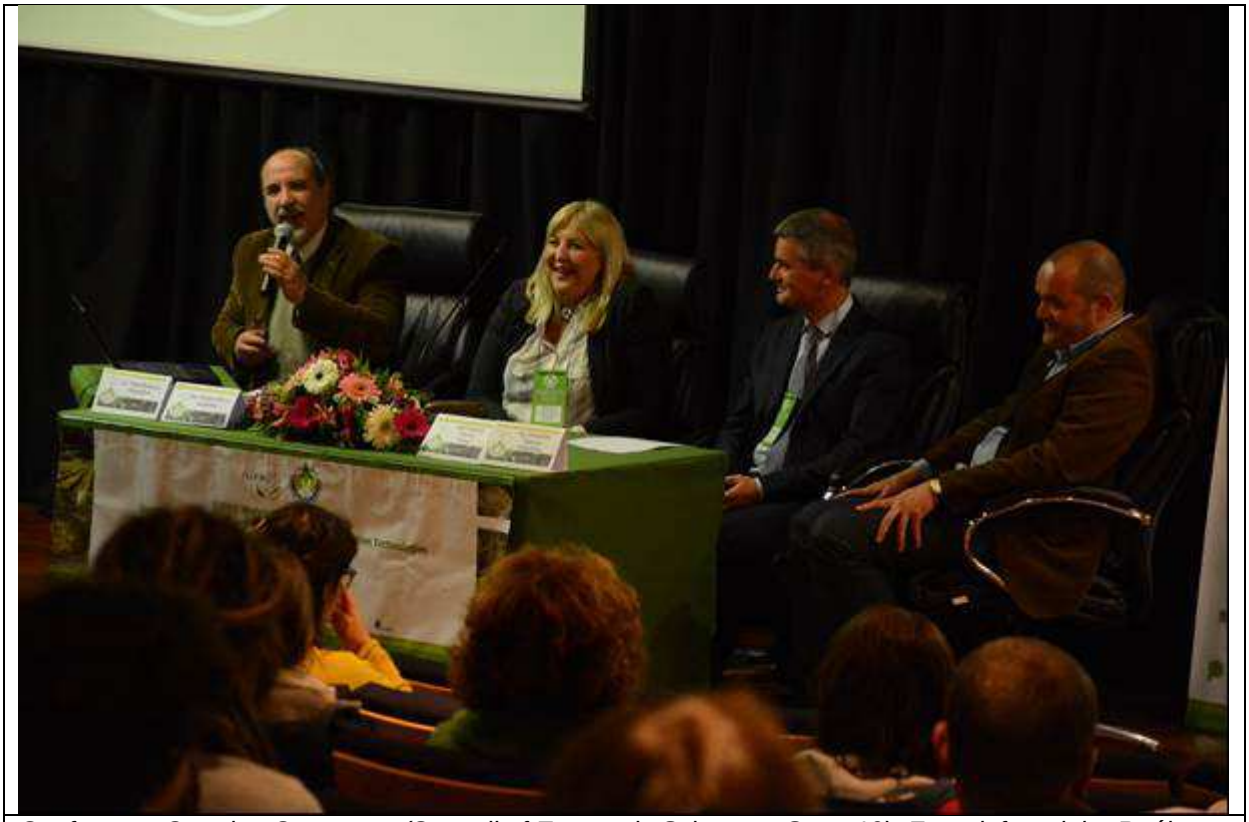
Thank you very much for your kind cooperation!

Sandra Sharry introducing the satellite workshop on "Innovation and challenges in the forestry sector" (FCAyF-UNLP, Sept. 19).

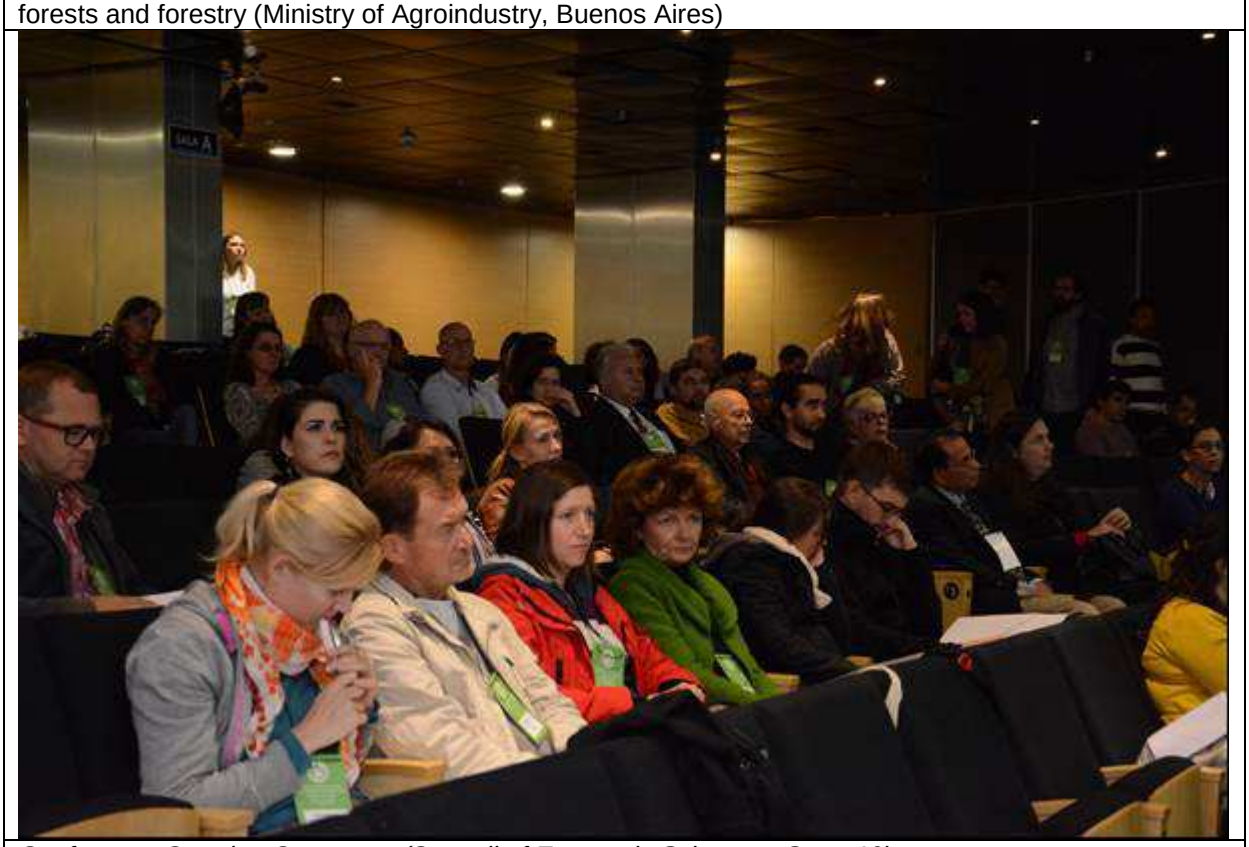


Satellite workshop on "Innovation and challenges in the forestry sector" (FCAyF-UNLP, Sept. 19)

Thank you very much for your kind cooperation!



*Conference Opening Ceremony (*Council of Economic Sciences*, Sept. 19). From left to right: Raúl Aníbal Perdomo (President of UNLP),* Sandra Sharry (Dean of FCAyF-UNLP), Jean-François Trontin (IUFRO 2.09.02 Coordinator) and Sebastián Galarco, Director of Development of the Delta Region, forests and forestry (Ministry of Agroindustry, Buenos Aires)



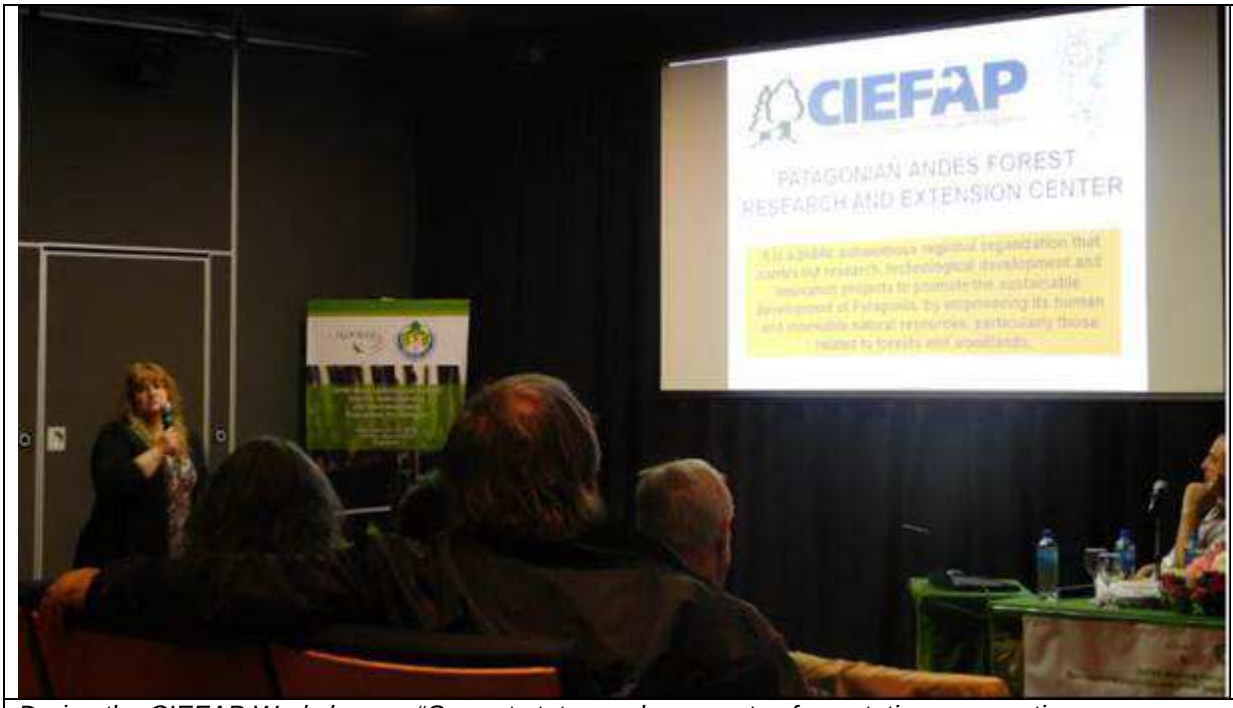
*Conference Opening Ceremony (*Council of Economic Sciences*, Sept. 19).*

Thank you very much for your kind cooperation!

Conference room (Council of Economic Sciences)

Poster room (Council of Economic Sciences)

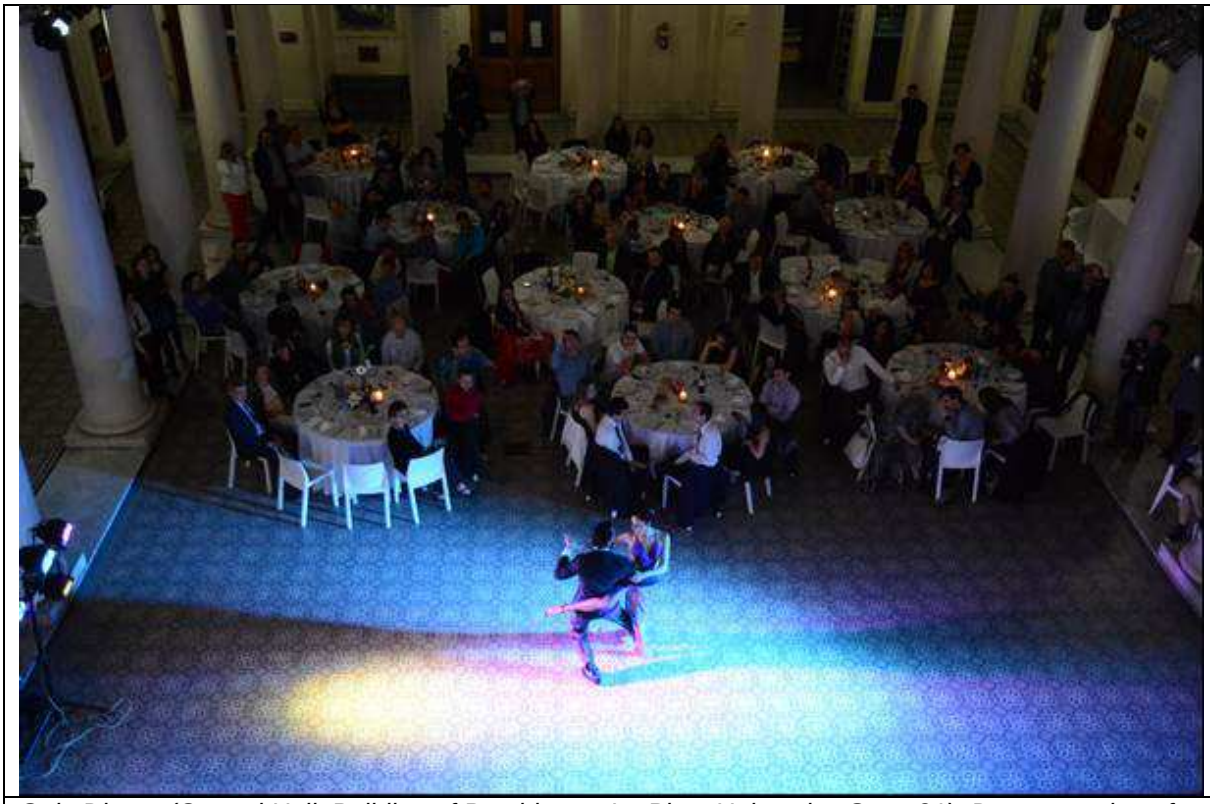
Thank you very much for your kind cooperation!



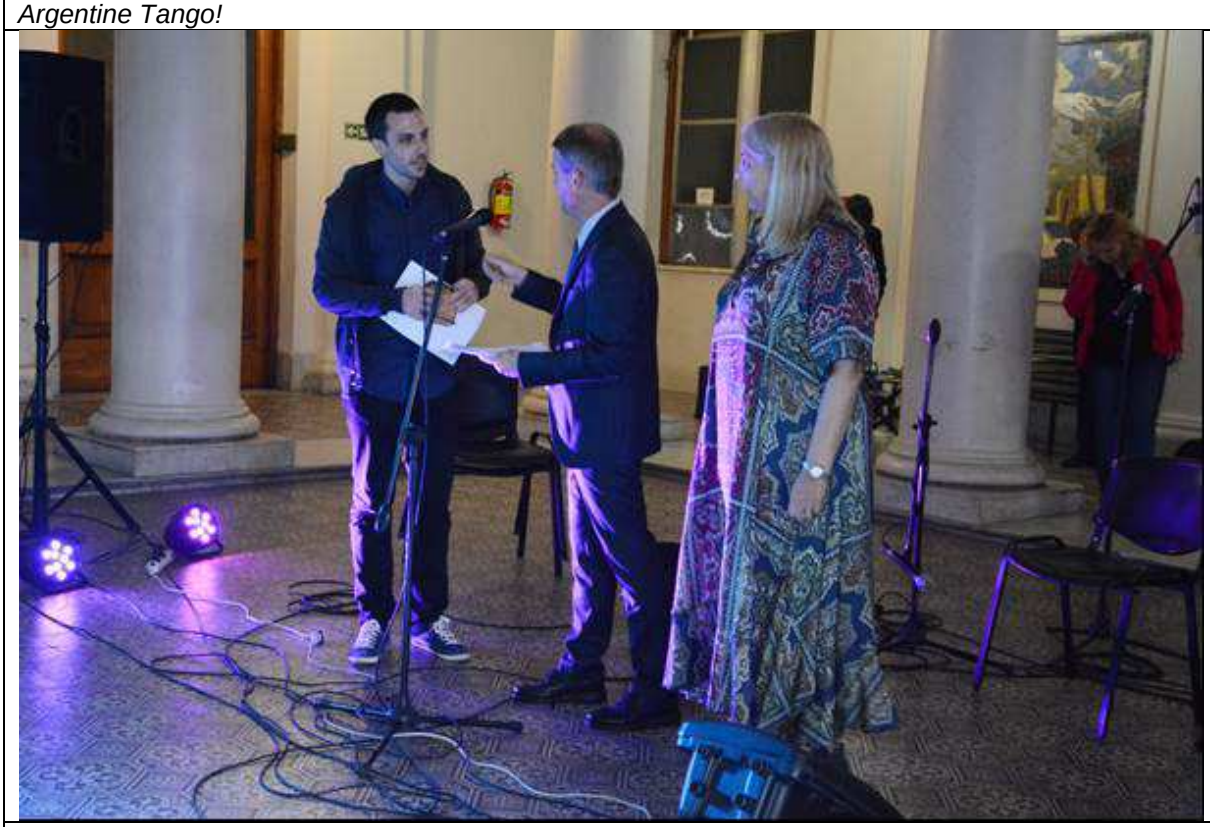
During the CIEFAP Workshop on "Current status and prospects of vegetative propagation technologies in Argentinean Patagonia" (Council of Economic Sciences, Sept. 21) – Co-chaired by Maria Laura Velez & Javier Grossfeld (CIEFAP, Argentina).

Gala Dinner (Central Hall, Building of Presidency, La Plata University, Sept. 21)

Thank you very much for your kind cooperation!

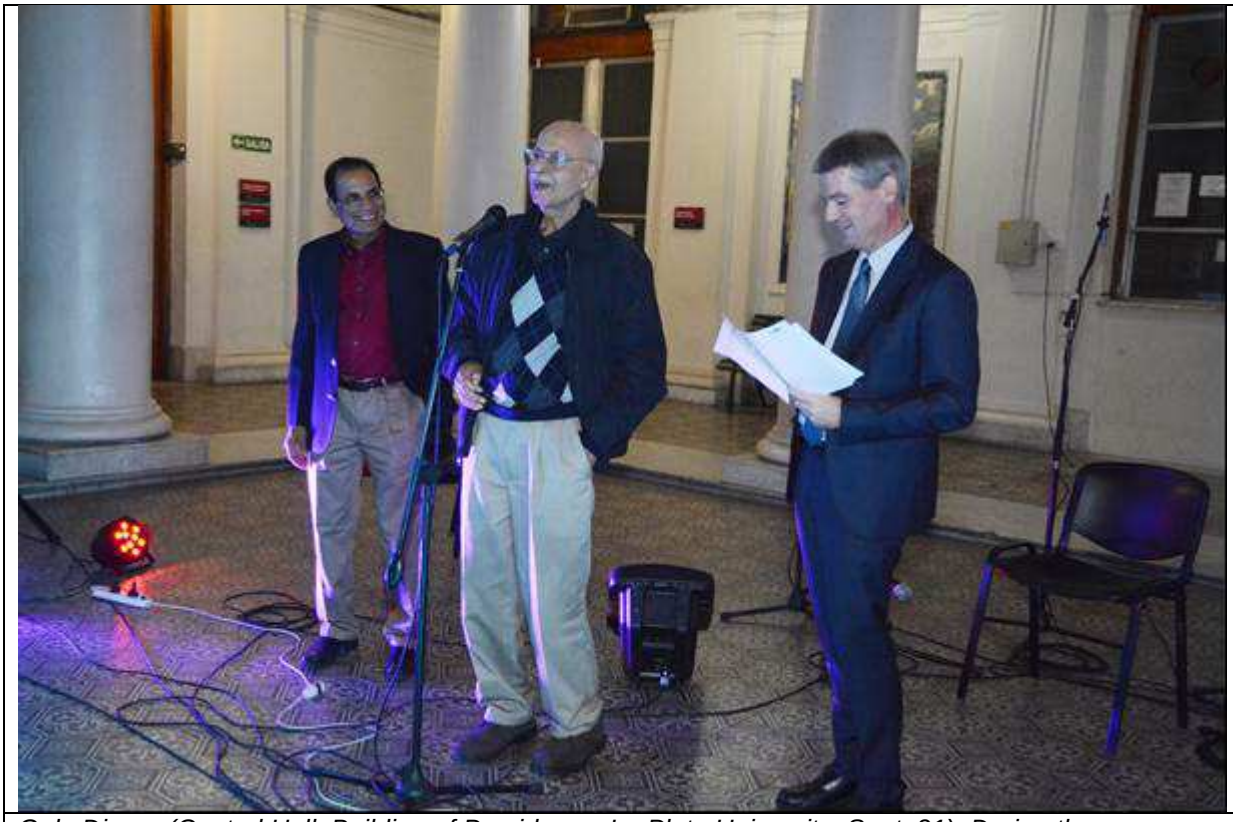


Gala Dinner (Central Hall, Building of Presidency, La Plata University, Sept. 21). Demonstration of Argentine Tango!

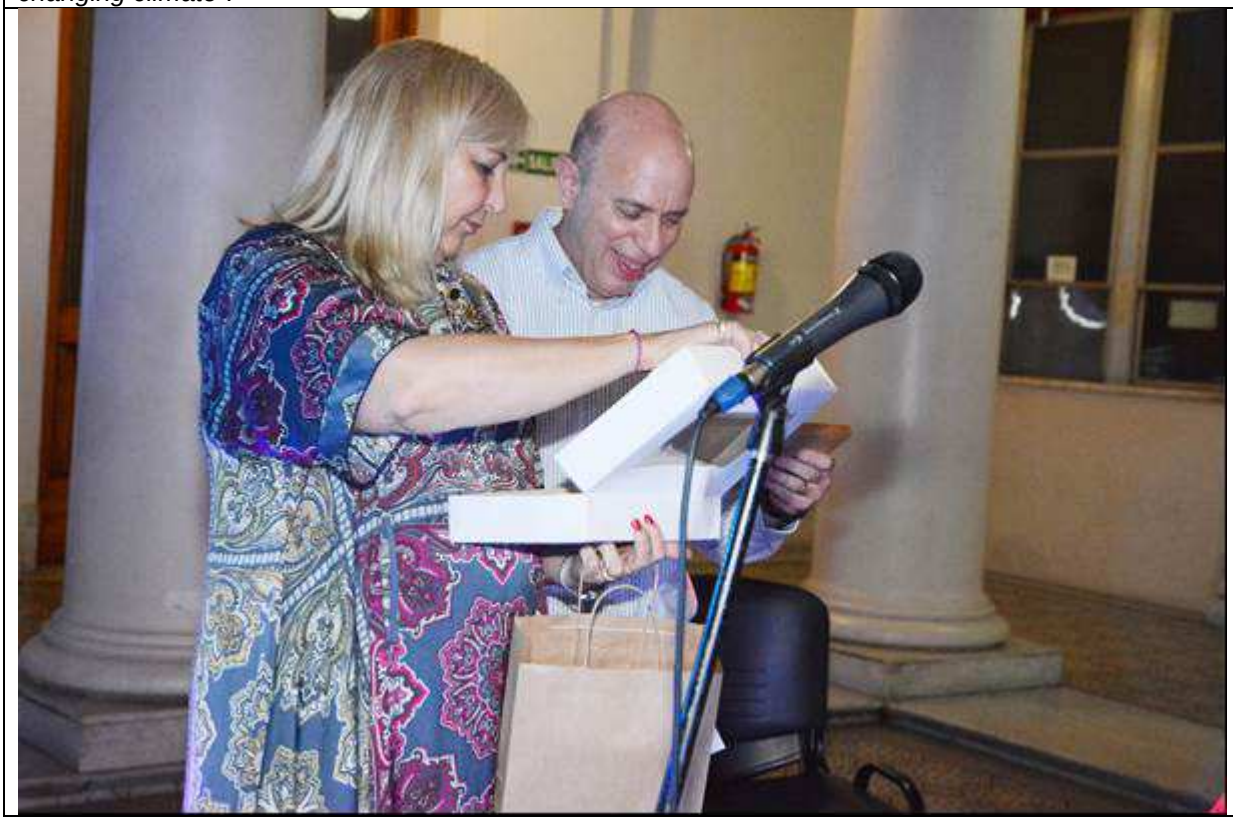


Gala Dinner (Central Hall, Building of Presidency, La Plata University, Sept. 21). Awarding João Filipe da Silva Martins (Portugal), the winner of the Second Biennial IUFRO 2.09.02 Student's Scientific Competition for his presentation on "Shoot proliferation of chestnut (Castanea sativa Mill.) and in vitro protective effect of endophytes against Phytophthora cinnamomi".

Thank you very much for your kind cooperation!

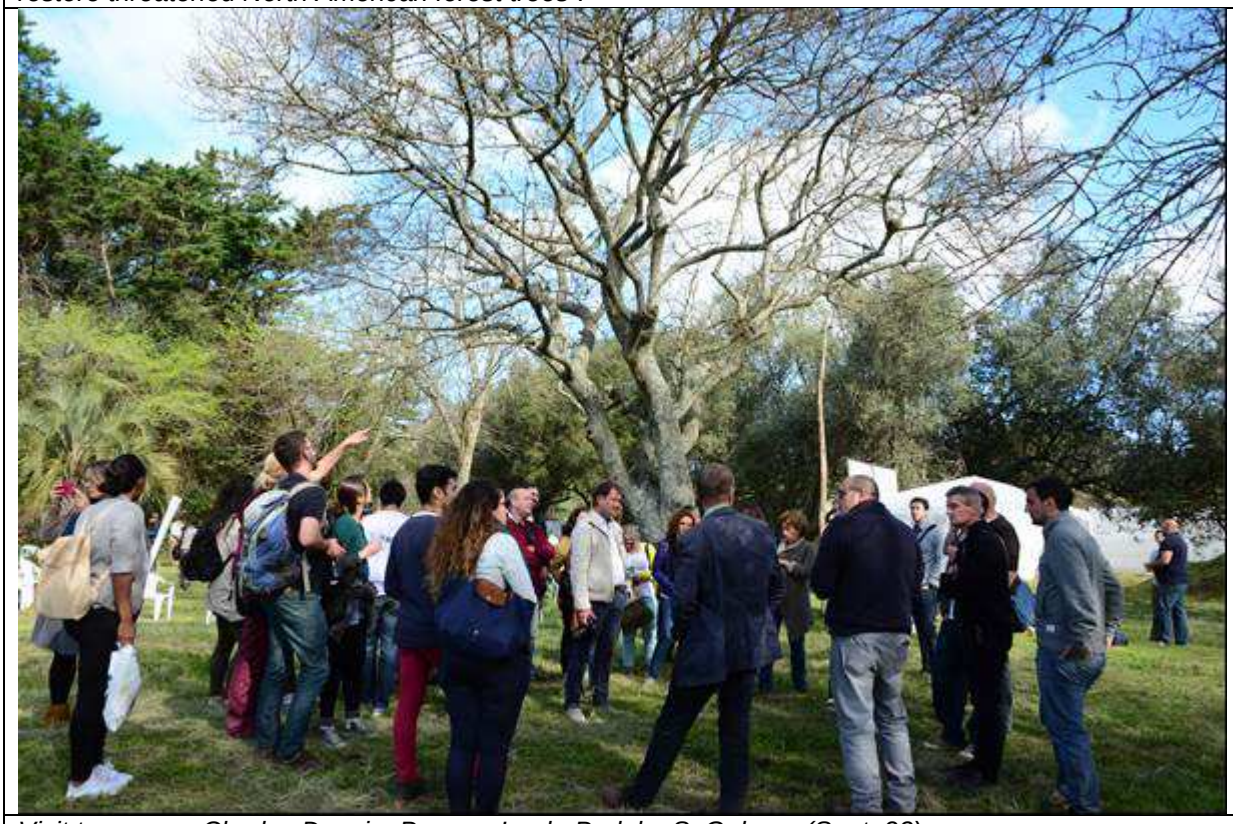


Gala Dinner (Central Hall, Building of Presidency, La Plata University, Sept. 21). During the recognition ceremony of Dr. M. Raj. Ahuja (USA) for "His Outstanding Contributions and Scientific Endeavours in Applied Forest Biotechnology, Especially Clonal Forestry". M. Raj Ahuja presentation during the conference (closing lecture) was about "Current status of forest tree biotechnology in a changing climate".



Thank you very much for your kind cooperation!

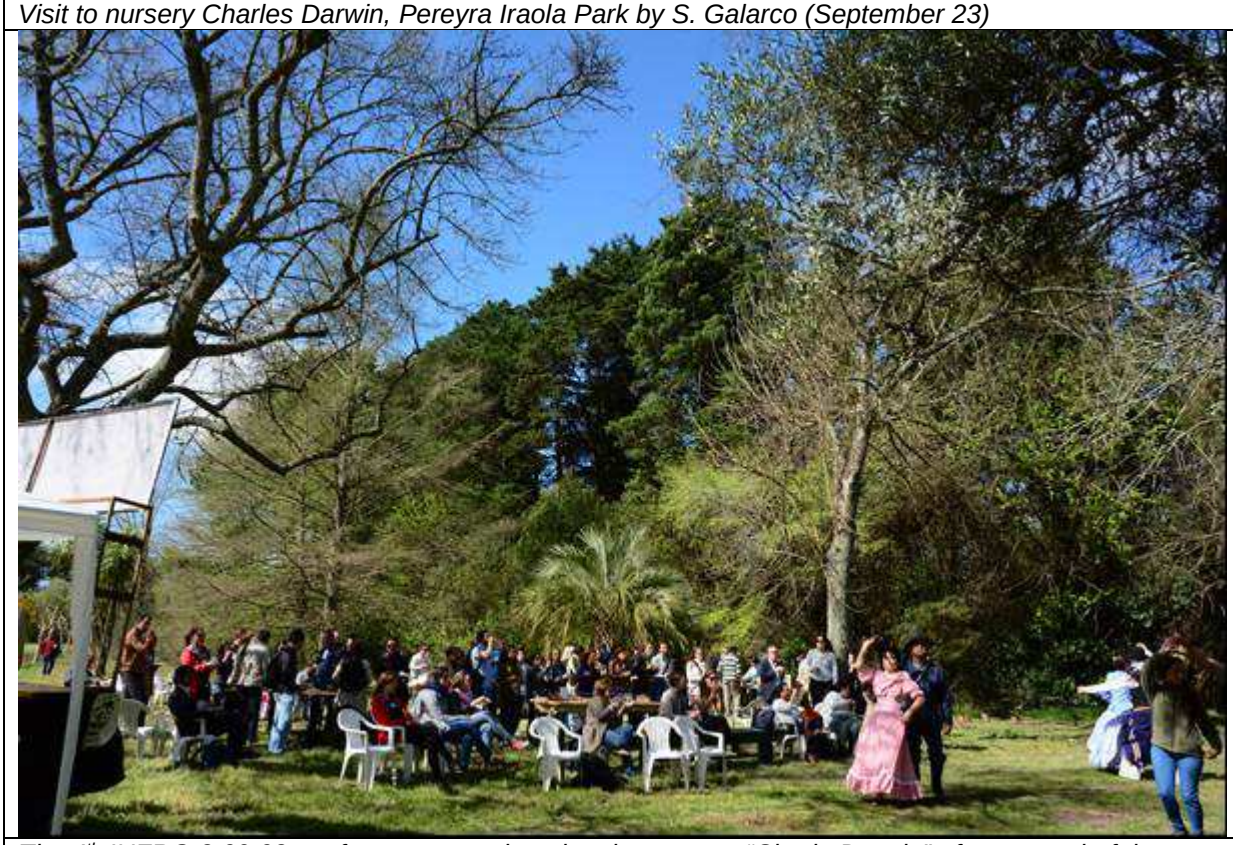
Gala Dinner (Central Hall, Building of Presidency, La Plata University, Sept. 21). During the recognition ceremony of Dr. Scott A. Merkle (USA) for "his Outstanding Contributions and Scientific Endeavours in the Vegetative Propagation of Trees, especially Somatic Embryogenesis in hardwoods". Scott A. Merkle presentation during the conference (key invited speaker, session 4) was about "Integration of selection, breeding, somatic embryogenesis and cryostorage to conserve and restore threatened North American forest trees".



Visit to nursery Charles Darwin, Pereyra Iraola Park by S. Galarco (Sept. 23)

Thank you very much for your kind cooperation!

Visit to nursery Charles Darwin, Pereyra Iraola Park by S. Galarco (September 23)



The 4th IUFRO 2.09.02 conference was closed at the nursery "Charle Darwin" after a wonderful barbecue with typical Argentinean food, folklore dance and beer tasting!

Thank you very much for your kind cooperation!