

EDITO

The objective of the TOPWOOD project is to build a four-year scientific exchange program about the test and development of medium and high-throughput phenotyping measurement and analysis tools for selected basic wood properties in the laboratory and in the field (**TO**ols for **P**henotyping **WO**OD-**TOPWOOD**). The participants of TOPWOOD are three academic institutions from Austria, France and Argentina and one private Company from Spain. The objective of this newsletter is, in addition to the personal contacts, meetings, video conferences and website, to improve the communication between the TOPWOOD participants. The edition of the first number has been greatly delayed, but from now on we plan to publish several issues each year.

TOPWOOD is organized into four Work Packages. The objective of the first issue of the Newsletter is to present the secondments that already took place up to now in the frame of Work Package 1. Next issues will be dedicated to Work Packages 2, 3 and 4.

TOPWOOD Work Packages

The project is organized into four work packages (WP): **WP1** is dedicated to the measurement of basic wood properties involved in wood quality, **WP2** aims at studying and developing measuring devices for wood functional traits, **WP3** aims at developing, discussing and disseminating data analysis methods dedicated to the large and complex data sets generated by these measuring devices and finally **WP4** is dedicated to coordination, management and dissemination.

WP1

Measurement of basic wood properties involved in wood quality

The objectives of WP1 are to test, calibrate and validate high throughput phenotyping tools for wood physical, chemical and mechanical properties in the laboratory and on standing trees. The WP1 is leded



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by A. Martinez Meier, INTA, Argentina. It is broken into three tasks:

1) Near Infrared Spectroscopy (NIRS, calibration, portable, micro NIRS) (resp. J.P. Charpentier, INRA, France), with development of NIRS Calibration for microdensity, vulnerability to cavitation and ultrasonic method, J.P. Charpentier, INRA. The seconded staff will collect wood samples in Spain and in Argentina, bring them to INRA, then will be trained to use the NIRS and the microdensity equipment and will acquire the corresponding data and eventually develop the calibration models. It also includes:

- The test of portable NIRS (resp. E. Merlo, MADERA PLUS, Spain). The portable NIRS will be used on standing trees in France (where some Spanish and Argentinean staff will be trained to use it), then used in Spain and in Argentina, in some cases with the assistance of other seconded staff. Data will be compared with laboratory NIRS spectrum acquired on the same trees.

SUMMARY

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- The test of micro NIRS (resp. V. Segura, INRA, France). Seconded Argentinean staff will be trained to use the microNIRS in France and will use it on French and Argentinean samples. Variation of microNIRS signal will be studied.

2) Microdensity: comparison of X-ray and High Frequency methods (resp. P. Rozenberg, INRA, France). Seconded Argentinean staff will be trained to use X-ray and High-Frequency microdensitometers and will acquire and compare profiles on Argentinean, Spanish and French plant material.

3) Test/validation of ultrasonic method (resp. E. Merlo, MADERA PLUS, Spain). The two sonic devices available in TOPWOOD (from Spain and Argentina) will be used and compared in France, Spain and in Argentina, seconded staff will be trained to use them and data will be compared with other data collected on the same trees (microdensity and other wood properties).

The following articles present activities developed so far in the frame of WP1.

MADERA PLUS (Spain) to INTA (Argentina) secondments

Esther Merlo and Oscar Santaclara, of MADERA PLUS, Spain, were TOPWOOD seconded staff to the National Institute for Agricultural Technology (INTA), Argentina, during August to October 2015.

The overall objective was testing wood quality using sonic methods in silvicultural management experiments, breeding trials and for characterization of *plus* trees.

Trees of different species were measured at INTA Montecarlo, Misiones and at INTA Bariloche, Río Negro province.

Measurements started in standing trees and were continued in logs, then in boards. Wood samples were

collected and sent to the laboratory for physical-mechanical characterization.



INTA (Argentina) to MADERA PLUS (Spain) secondments

During October 2016, Hugo Enrique Fassola of INTA Montecarlo, National Forestry Program Coordinator of INTA, was seconded to MADERA PLUS S.L in Spain. The aim of the secondment was to exchange knowledge and experience in non-destructive methods used in determining wood properties. Another objective was to develop contacts with local industries interested in testing the efficiency of sonic and NIRS tools in the classification of timber quality.

Throughout March 2016, Angela Winck, of INTA Montecarlo, Argentina, was also seconded to MADERA PLUS, Spain. The purpose of the stay was to evaluate the effectiveness of different sonic equipment in order to characterize wood quality at clone and provenance level. During the same secondment, Angela also worked to evaluate the effectiveness of the equipment in determining the influence of silvicultural treatments on the wood quality of *Pinus radiata* from Spain and New Zealand provenances.



Angela Winck, INTA Montecarlo, evaluating the effectiveness of different sonic equipment in order to characterize wood quality of *Eucalyptus globulus* clones selected by ENSE Energy and Pulp Company and of *Pinus radiata* provenances

Gonzalo Caballé, INTA EEA Bariloche, began his one-year secondment in Madera Plus, Spain, in January 2016.

The purpose of his stay is to develop models to characterize wood quality with sonic methods from standing trees for the industry production chain in three species: *Pinus pinaster*, *Pinus radiata* and *Eucalyptus globulus*.

The results will provide new insights into the influence of silvicultural management on wood quality.

During his secondment in Spain, he also extracted increment cores from the same trees. In July-August 2016, he obtained the microdensity profiles and NIR spectra of these samples in the Genobois laboratory at INRA Val de Loire-Orléans, France.



INRA- INTA secondments

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Jean Paul Charpentier, researcher and director of the Genobois laboratory at INRA Val de Loire-Orléans, France, visited INTA Bariloche during December 2015 and January 2016.

He trained Argentinean staff to obtain NIR spectra on cypress and Douglas-fir using a new Bruker – MPA equipment bought recently by INTA Bariloche.

The objective is to develop an indirect method of measurement of vulnerability to cavitation and is part of WP1, task “Development of NIRS Calibration for microdensity, vulnerability to cavitation and ultrasonic method”.

Antonio José Barotto, PhD student associated to INTA Tandil, Argentina, was seconded for a stay at INRA Val de Loire-Orléans from April to July 2016 in the framework.

His doctoral thesis aims at unravelling the functional meaning of *Eucalyptus* wood in terms of resistance to drought and frost stress. In this regard, he carries out measurements of wood functional variables such as vulnerability to xylem cavitation induced by tension and freeze-thaw processes, maximum hydraulic conductivity and capacitance.

Those functional traits are related with several anatomical traits determined by different microscopic techniques, and with structural or optical wood traits, such as microdensity and reflectance in the near-infrared spectrum. The secondment of José Barotto allows him to process wood samples with X-Ray and near-infrared spectroscopy equipment.



Bruker –MPA equipment bought recently by INTA Bariloche

Research Technician

A special topic of TOPWOOD is dedicated to developing new skills and opportunities for technical staff of the project participating institutions.

Jose Almeida is a research technician at INRA Val de Loire. He was seconded to in INTA Bariloche, Argentina, during September to November 2015.

During his three months-stay he was trained to obtain vulnerability curves using different methods. He was trained in the use of the Embolitron, a prototype being developed between INTA and INRA with the aim of automatizing the construction of vulnerability curves by the air injection method. He worked together with Guillermina Dalla-Salda and Anne-Sophie Sergent measuring different kinds of samples from different species such as *Austrocedrus chilensis* and *Nothofagus pumilio*, both native species from Patagonia, Argentina.



Inès Bertoldi has a basic training of technician in radiology. She works as a public administrator at INTA Bariloche, Argentina. During 2016 she carried out three secondment periods of two months each at INRA Val de Loire, Orléans. Inés learned to develop X-ray and high-frequency microdensity using samples collected in Argentina, France and Spain. She also learned to develop NIRS spectra on several forest species (*Eucalyptus*, Douglas-fir and cypress). The microdensity profiles obtained during Inés' secondments at INRA Val de Loire-Orléans will be used to study the relationships between different techniques of wood phenotyping. The new skills assimilated by Inés Bertoldi will give her new opportunities of career development in her Argentinean research institute.



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