

CNR-IVALSA

National Research Council of Italy

Trees and Timber Institute

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The Trees and Timber Institute of the National Research Council of Italy was created in September 2002 by merging three research institutes: the Institute for the Propagation of Tree Species (IPSL), the Institute of Wood Research (IRL) and the Institute of Wood Technology (ITL). The Trees and Timber Institute is the biggest Italian institute for research in the wood-forest sector.

The staff of IVALSA comprises 70 people, divided between the branches in Trento, Florence and Grosseto. The research activities cover wood technology, technological development of wood and wood-based products, innovative timber building techniques, dendrochronology and preservation of cultural heritage, protection and valorisation of forests, assistance for companies, education and documentation services.

The laboratories are equipped with state-of-the-art testing machinery and offer consultancy and certification services.

IVALSA collaborates with many universities for the preparation of master and doctoral theses, and participates in many national and European research projects. Moreover, IVALSA takes part in standardisation activities for the entire area of wood and forests on both the national and European level.

IVALSA is a meeting place for scientific and technical exchanges; the natural reference point for the wood sector and for whoever is dealing with wood as a specialist, researcher, designer or building contractor.

www.ivalsa.cnr.it



IVALSA MISSION

IVALSA aims to improve scientific knowledge and to develop technological applications and solutions, thus strengthening the competitiveness of forest- and wood-based products in all application areas.

IVALSA RESEARCH

- Characterisation, selection and propagation of tree species and biodiversity preservation
- Valorisation and protection of the agro-forest environment
- Forest mechanisation and biomass supply
- Improvement of the quality of timber production in forests and plantations
- Cultural heritage
- Promotion of wood technology, and civil and industrial uses of timber

IVALSA LABORATORIES

The laboratories at IVALSA form an internationally renowned research centre. They are equipped with state-of-the-art instruments and perform consulting and certification activities.

The main facilities comply with the provisions of UNI CEI EN ISO/IEC 17025 on “quality assurance management of testing laboratories”. IVALSA has acquired the status of notified body and can perform initial type testing for the following product families: “windows and pedestrian doorsets” (UNI EN 14351-1), “curtain walling” (UN EN 13830) and “glued laminated timber structures” (UNI EN 14080).

- Laboratory of wood chemistry and wood products
- Laboratory of histo-anatomy and microscopy
- Physical and mechanical laboratory
- Laboratory of in vitro technologies and cryopreservation
- Preservation and biodegradation laboratory
- Laboratory of xylogenesis
- Laboratory of in vitro propagation
- Laboratory of forest mechanisation and biomass supply
- Laboratory of anatomical characterisation of wood
- Laboratory of pomology
- Laboratory of wood quality and non-destructive testing
- Windows and curtain walls laboratory
- Fire laboratories
- Laboratory of wood drying
- Mechanical testing laboratory
- Laboratory of dendrochronology



Laboratory of wood chemistry and wood products

The activities of the laboratory of wood chemistry and wood products cover various aspects of chemical technologies applied to the wood sector. These activities include the assessment of chemical composition of wood, measurement of calorific value of wood and wood products, characterisation of adhesives and gluing products (both for structural and non-structural use), and study of the interphase between wood and adhesives or between wood and coatings.



Laboratory of histo-anatomy and microscopy

The laboratory for wood histology, anatomy and microscopy performs in vitro and in vivo analyses of vegetal tissues. It is equipped with a complete set of instruments for the preparation and embedding of the samples, stereomicroscope, optical POLY-VAR microscope, extractor hood, etc.



Physical and mechanical laboratory

The physical and mechanical laboratory carries out tests on wood and wood-based materials covering both timber for structural use (solid and glued laminated timber, structural panels) and non-structural use (characterisation of wood as raw material). In particular, visual and machine strength grading systems are developed, using non-destructive instruments. For glued products, the bonding quality is verified, both with mechanical and delamination tests.



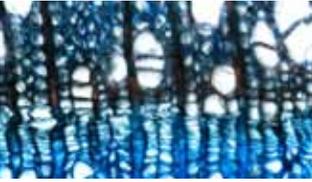
Laboratory of in vitro technologies and cryopreservation

The laboratory has the necessary equipment and expertise to carry out biotechnological investigations, applied to micropropagation, in vitro conservation (slow growth storage) and cryopreservation of plant species. The laboratory contains laminar flow hoods, equipment and climatic chambers at high light intensity, fitting for the in vitro proliferation and conservation of selected shoot cultures and embryogenic callus lines. An advanced cryobank for the conservation in liquid nitrogen of organs and tissues completes the laboratory.



Preservation and biodegradation laboratory

Breeding under laboratory conditions of the most important timber pests (*Hylotrupes bajulus*, *Lyctus brunneus*, *Trichoferus holosericeus*) and of certified fungal strains that degrade wood in different service conditions (Basidiomycetes, Ascomycetes, Deuteromycetes) can be undertaken. These organisms are used for the evaluation of the protective effectiveness of wood preservatives and the natural durability of wood genotypes.



Laboratory of xylogenesis

The laboratory of xylogenesis consists of three sections: auxometry, i.e. development of biomarkers for forecasting models of wood production in response to abiotic stresses (water shortage and warming); biochemistry, i.e. determination of non-structural carbohydrates, cell wall components and stem water relations during the wood formation; anatomy, i.e. study of cell differentiation in the cambial region and xylem architecture.



Laboratory of in vitro propagation

For more than twenty years, this laboratory has been carrying out experiments on in vitro propagation of fruit (Actinidia, Chestnut, Apple, Olive, Pear, Peach, Grapevine) and ornamental species (*Cycas revoluta*). Plant propagation is ensured by appropriate in vitro cultivation techniques: axillary bud multiplication, organogenesis and somatic embryogenesis.



Laboratory of forest mechanisation and biomass supply

This research field deals mainly with technical, economic and environmental optimisation of forest harvest operations with a strong focus on young and low quality stands, which provide mostly biomass for industrial and energy use.

The laboratory offers reliable data on operation productivity and biomass production costs, as obtained with optimised operations. It helps forestry stakeholders to rationalise their production process. Dedicated decision support programs are built and the know-how is transferred through publications, workshops, conferences, courses and practical field demonstrations.

The activities cover all the Italian territory as well as foreign countries in Europe, and South and North America, resulting in an important network of international collaborations.



Laboratory of anatomical characterisation of wood

The activity is mainly focused on the in-depth survey of the anatomical structure of wood specimens extracted from artefacts of cultural heritage: wood sculptures, panel paintings, marqueteries, archaeological finds, in situ members of structures etc.

Microscopy analyses of the samples allow the identification of the wood species, the determination of the actual condition of the artefacts and the possible need of targeted preservation measures against abiotic and biotic attacks.

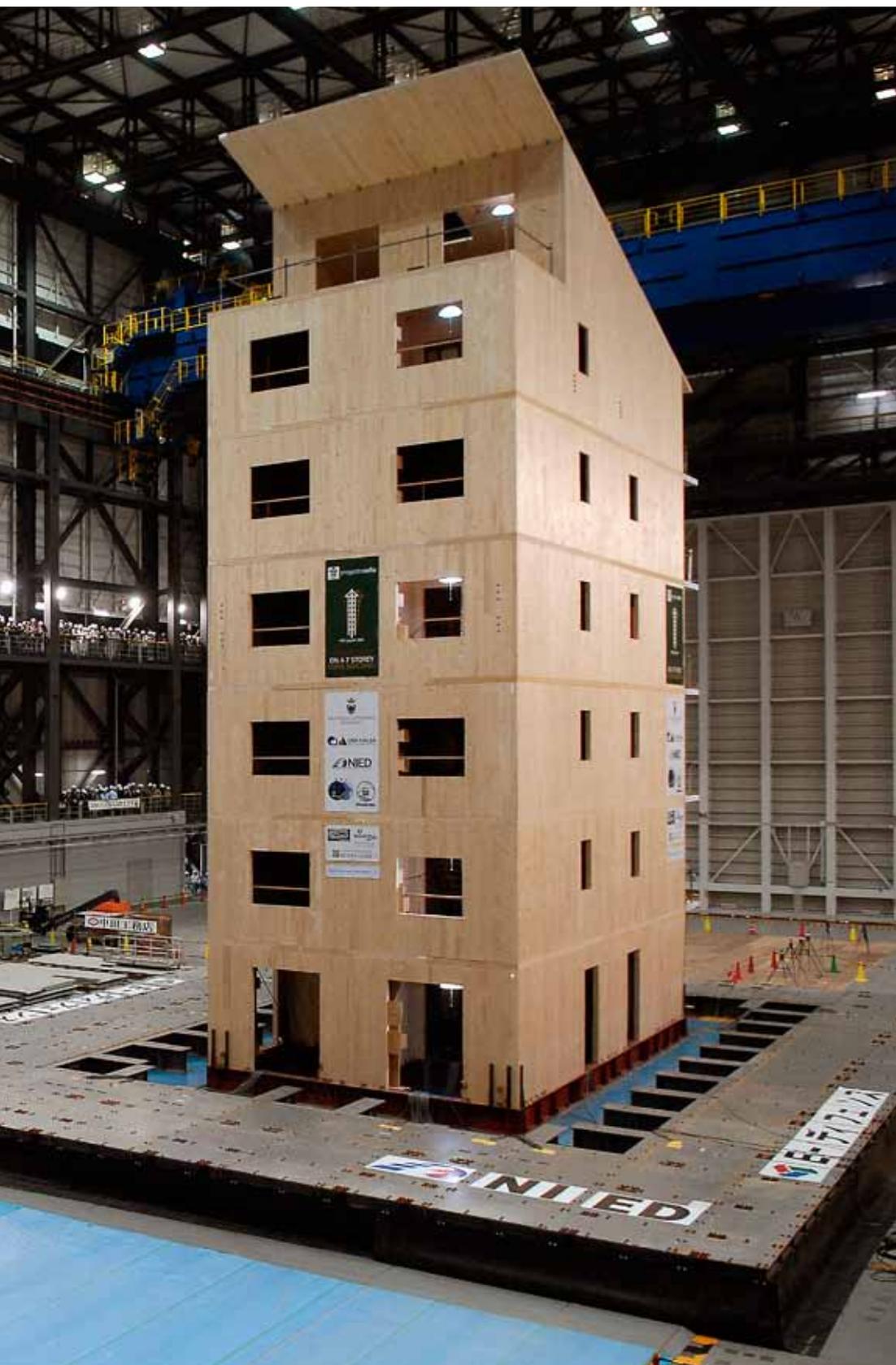


Laboratory of pomology

The laboratory of pomology focuses its research activities mostly in the sectors of genome mapping and quality improvement of deciduous fruit tree production.



Sofie Project. Seismic test on a 7-storey X-Lam building, Miki (Kobe) 2007. Picture: Romano Magrone





Laboratory of wood quality and non-destructive testing

The accurate definition of measurable indicators of “wood quality” in different operational contexts is the main concern of the laboratory. Basic and applied research activities are devoted both to the improvement of existing test standards and to the development of new standards when needed.

The laboratory comprises four “measurements platforms”, i.e. sets of advanced measuring equipment modules, which can be flexibly arranged in order to build up a measurement system carefully tailored to the research task to be performed:

- Measurement platform for solid wood and sawn timber
- Measurement platform for veneers and wood surfaces
- Measurement platform for wood-based panels and acoustic boards
- Measurement platform for biomasses



Windows and curtain walls laboratory

The laboratory is authorised under the 89/106/EC Directive as a notified body of the initial type tests for the following product families: Windows and pedestrian doors (UNI EN 14351-1), and Curtain walling (UNI EN 13830).

The windows and curtain walls laboratory performs research and tests on windows, doors, dimming systems, curtain walls and roof lights or accessories using methods in accordance with standards or customised test setups. Windows of any material such as PVC and aluminium, responding to different technological realities available on the market, can be tested. The laboratory complies with the Quality Management System according to UNI CEI EN ISO/IEC 17025.



Fire laboratories

Completely renovated and expanded, the fire laboratories offer their support to companies who plan to develop innovative products for passive fire protection.

The fire laboratories are members of the following committees: Technical Committee UNI “Fire behaviour”, Technical Committee TC2 “Fire resistance” of Egolf – European Group of Organizations for Fire Testing, Inspection and Certification, Technical Committee TC1 “Reaction to fire” of Egolf.

The laboratories comply with the Quality Management System according to UNI CEI EN ISO/IEC 17025 and are equipped with advanced instrumentation. The laboratories perform all the required tests concerning the characterisation of the fire behaviour of materials and construction elements (doors and closures) as well as tests on fabrics, upholstered furniture and paint.

Participation in international R&D projects and testing for certification purposes of private customers and enterprises are both part of the activities carried out by the IVALSA Fire Laboratories.



Laboratory of wood drying - LABESS

LABESS has the largest and best equipped facilities for wood drying tests in Italy. It operates in the fields of wood drying and wood hydrothermal modification.

Participation in R&D projects and consulting services for kiln drying plant manufacturers and users are the main activities of this laboratory.

Basic and applied research is carried out in the following fields: wood drying, wood thermal modification, mass and energy transport in wood (measurement techniques and modelling) and wooden cultural heritage preservation (monitoring and modelling of deformations and mechanical degradation of wooden artefacts due to climatic variations).



Mechanical testing laboratory

The laboratory is authorised under the 89/106/EC Directive as a notified body of the initial type tests for the following product family: Timber structures - Glued laminated timber - Requirements (EN 14080).

The Mechanical Testing Laboratory deals with the determination of physical and mechanical properties of wood and wood-based products. The laboratory acts under the provisions of a Quality Management System, according to UNI CEI EN ISO/IEC 17025.

It carries out research activities within the framework of publicly funded projects (regional, national, EU, international). Consulting services and technical assistance for private customers and enterprises are constantly ongoing.

The Mechanical Testing Laboratory has fully equipped facilities and is able to perform both certification testing and any kind of voluntary testing on all types of structural and nonstructural wood-based products.



Laboratory of dendrochronology

The main activity of the laboratory is related to dendrochronological dating of wooden objects of historic and artistic interest. The objects include structures (historical buildings, rural buildings, bridges, etc), art works (paintings, sculptures) and agricultural, handicraft or industrial tools. An archive of master chronologies valid for Trentino is under construction.



IVALSA AZIENDA SPERIMENTALE SANTA PAOLINA



The “Santa Paolina” experimental farm in Follonica is a centre for plant biodiversity conservation and supports the research activities of IVALSA.

Since 1966, the farm has hosted large cultivar collections of pear, peach, olive, persimmon, apple and quince trees.

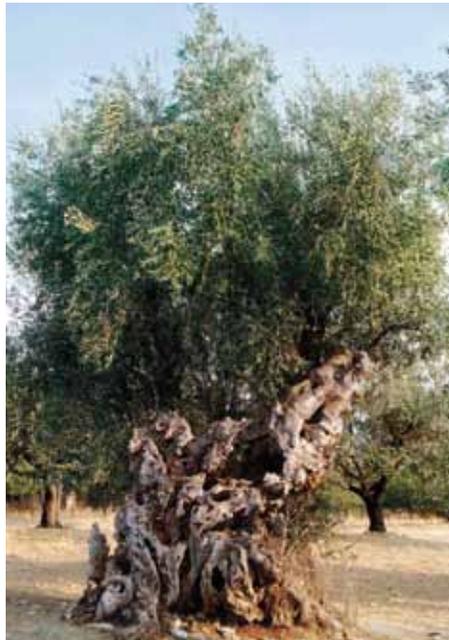
Since its foundation, the farm operates as a centre of research, providing support and professional information for private and

public companies of the agro-food chain in cooperation with agricultural associations, public institutions and administrations.

Studies and research projects for agricultural development and environmental conservation are carried out in Santa Paolina. The farm is a centre for testing and spreading of technological innovation, in-field demonstration and professional teaching.

The facilities of the farm are used by private companies to test new plant protection products and fertilizers as well as new machineries.

Santa Paolina is an authorised plant nursery producing Conformitas Agraria Communitatis (CAC) fruit trees, it is also recognised as one of the few Italian pre multiplication centres for the production of virus-free certified olive propagation material.



IVALSA LIBRARY

The library currently consists of approximately 25.000 documents (books, manuals, conference proceedings and multimedia) and 100 regular journals. It is possible to consult approximately 3000 electronic journals and databases on CD-ROM.

The purpose of the library is not only to acquire and preserve wide and up-to-date scientific documentation, but also to promote and disseminate information and to encourage interest in the wood-forest sector.

IVALSA XYLOTHEQUE

The IVALSA xylotheque collects a variety of wood samples coming from all over the world. Each wood specimen is accompanied by a complete identification and characterisation form including a list of both scientific and vernacular names. Thin sections for microscopy and other anatomical preparations are also available. All the information for the identification of wood species is managed through a digital database. The collection presently counts about 10.000 wood samples related to 5.700 different botanical species. Prepared thin sections, sliced along the three main anatomical directions for microscopic wood identification analyses, are available for about 4.000 wood species.

IVALSA COURSES

IVALSA offers comprehensive training courses covering all aspects of wood. These courses are open to the public and the private sector.

IVALSA offers training courses which are aimed at educating scientific and technical personnel. Also courses on request on specific topics can be organised. Furthermore, training courses for forestry worker are offered.

Covered topics

- basic wood knowledge
- propagation
- arboriculture
- in vitro technologies and cryopreservation
- restoration of artwork
- use of machinery for forest operations and maintenance of public parks
- mechanisation and use of biomass
- windows, doors and CE marking
- fire resistance
- wood use and technology
- structural use of timber in buildings
- sustainable use of timber in architecture

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