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NIRwood – SMART AND TRANSPARENT TIMBER TRADING

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Poor timber quality can result in problems during the manufacture of wood products, having potential negative repercussions for both traders and importers. Similarly, due to current EU legislation on forest legality, if the timber's origin is not ensured, imported timber can be retained, causing economic losses as well as financial penalties, and/or detention penalties for traders in some EU countries.

Application scenario
Timber tree species detection for wood traceability to counter illegal logging.
Digital technologies
Near infrared (NIR) spectroscopy.
Socio-economic impact
▪ Economic: avoidance of economic loss and financial penalties. ▪ Environmental: preservation and protection. ▪ Social: awareness creation.
More info: NIRwood

Illegally logged and traded wood represents 19% of the total wood products imported into the EU. For this reason, the European Commission approved the European Timber Regulation (EUTR), which aims at combating this problem. It applies to all wood-related products commercialised in the EU, including internal production and imports. Nowadays, timber traceability methods mainly consist of documentary control that can be easily falsified, and more rarely slow and expensive laboratory wood analyses.

A technological approach based on near infrared technology (NIR) is implemented in the NIRwood project. NIRwood aims at being an on-site system for the identification of origin and quality of wooden products, based on a NIR spectrometer analysis. NIR spectrometers can clearly identify physical, mechanical and chemical properties of wood, giving the possibility to recognise different tree species, identify the origin of woods, and realise quality assessments.

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Purpose of the tool

NIRwood aims to provide the timber market (producers, traders, manufacturers, transformers and environmental authorities) with a reliable, precise, quick and affordable tool to ensure that their wood products are of the type and quality they expected, avoiding fraud and illegalities. NIRwood's objective is the creation of a huge timber spectral database, which will include NIR spectra from protected tree species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as well as most commercial species.

Description of the tool

NIR technology is very useful to check the quality and origin of wooden products. With NIR spectroscopy, the absorption or transmission of light in the range of the electromagnetic spectrum in the near infrared region (780 to 2500 nm) is analysed. Depending on the physical structure and the chemical composition of the analysed material, a specific absorbance spectrum is obtained, the so-called "fingerprint" of the material. NIR spectrometry applied to timber provides information about the chemical composition and structure (moisture, lignin content, sugars, etc.), and physical and mechanical characteristics (strength, density, etc.). NIR spectrometry also allows to determine phenotypical differences in timber due to the influence of local conditions where the tree grew (soil, altitude, climate, silvicultural treatments, and others), enabling specimens to be grouped by geographical origin.

All collected data will be treated to create a mathematical algorithm that allows the identification of a certain species and its origin just by scanning its spectrum. This is called the NIRWOOD prediction model and it will be embedded in a cloud-based platform that is easy-to-access by everyone, everywhere. Its accuracy will make it possible to ascertain wood species and origin instantly just by using a portable NIR device that scans the timber on-site, avoiding economic losses caused by fraud.

Areas of socio-economic impacts

Social	Creation of awareness of illegal logging and wood from endangered tree species.
Economic	Avoidance of economic loss and financial penalties.
Environmental	Preservation of the natural environment and woodlands, protection of endangered tree species.