Sintetic
SINGLE ITEM IDENTIFICATION FOR FOREST PRODUCTION, PROTECTION AND MANAGEMENT

D6.3

Practice abstract - batch 1: 1- Procedures to trace the origin of timber products 2- Early quality assessment of timber products

Project Acronym: SINTETIC

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List of abbreviations

Acronym / Abbreviation	Meaning / Full text
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
CAP	Common Agricultural Policy
CO_2	Carbon dioxide
CT-scan	Computed Tomography scan
EU	European Union
EUDR	EU Regulation on Deforestation-free products
FSC	Forest Stewardship Council GmbH
NDT	Nondestructive testing
NGOs	Non-governmental organizations
NIR	Near-infrared spectroscopy
QR codes	Quick-Response code
RFID	Radio-frequency identification
SINTETIC	Single item identification for forest production, protection and management
X-ray	Röntgen radiation

Introduction

This deliverable presents two Practice Abstracts prepared in the EIP-AGRI Common Format and disseminated via the EIP-AGRI portal. It begins by situating these abstracts within the broader context of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), explaining its mission, structure and strategic importance in fostering innovation across agriculture and forestry. The first abstract addresses procedures for tracing timber products from stump to final market, while the second examines methods for early quality assessment of timber. Together, they exemplify how interactive, evidence-based innovations can drive legal compliance, resource efficiency and rural development.

About EIP-AGRI and Its Importance

The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) was launched in 2012 as part of the EU's 'Europe 2020' strategy to promote smart, sustainable and inclusive growth through research and innovation in agriculture and forestry.

EIP-AGRI employs a multi-actor, bottom-up approach, bringing together farmers, advisors, researchers, businesses, NGOs and public authorities to co-create practical solutions to real-world challenges.

This network is underpinned by dedicated funding streams from the Common Agricultural Policy (CAP) rural development programmes and the EU's Horizon research and innovation framework, enabling Operational Groups, multi-actor projects and Thematic Networks to collaborate and share knowledge

By pooling diverse expertise and aligning multiple funding instruments, EIP-AGRI accelerates the transfer of innovations from research into practice, fostering resilience to climate change, market volatility and evolving environmental regulations

Its interactive web platform and EIP-AGRI portal serve as centralized hubs for matchmaking, project databases and knowledge exchange, increasing transparency and facilitating up-take of successful innovations across Europe.

Overview of Practice Abstracts

This deliverable presents two Practice Abstracts that have been uploaded in the EU-CAP network:

Procedures to Trace the Origin of Timber Products

Reliable timber traceability underpins legal compliance (e.g. EUDR), sustainability certification (e.g. FSC) and consumer confidence. This abstract reviews optical marking (punched codes, QR codes, barcodes) and RFID tagging—highlighting durability, tamper-resistance and cost trade-offs—and explores fingerprinting via and inherent wood features. It describes how SINTETIC integrates harvest-stage RFID and punched codes with sawmill-level fingerprinting, all linked by a centralized geodatabase for end-to-end transparency, optimized logistics and scalable deployment.

Early Quality Assessment of Timber Products

Early-stage grading of standing trees or freshly felled roundwood informs supply planning, maximizes yield and supports market differentiation. This abstract examines challenges in in-situ strength and stiffness estimation, hidden defect detection and extrapolation of localized NDT data, then surveys advanced tools—laser scanning, photogrammetry, NDT for density measurement, sonic tomography, resonance testing and laboratory core analyses. It highlights the need for calibration and integration of these methods and calls for a harmonized European framework, standardized metrics and regional quality labels to unlock economic, environmental and social benefits throughout the supply chain.

Procedures to trace the origin of timber products

SINTETIC project addresses the challenge of ensuring reliable timber traceability within the forest supply chain. A robust traceability system helps track logs from origin to final product, ensuring legal compliance (EUDR), sustainability, and certification (e.g., FSC). Traditional tracking methods struggle with environmental conditions, tampering, and cost-effectiveness. Kaulen et al. (2023) review various traceability technologies, some were chosen for the project and linked by a central geodatabase for traceability, transparency and efficiency. Other technologies, not used in the project, are Biometric log traceability based on log ends under improvement and the costly DNA analysis that require extensive databases.

1. Marking Techniques (Punched codes, QR Codes, barcodes, RFID Tags): First three are optically readable and cost-effective but can degrade in harsh conditions or not being readable. RFID Tags are reliable for automated identification, with high survival rates (~98%) in forest operations but require durable, weather-resistant designs and anti-tampering measures when marking.

2. Fingerprinting (X-rays, CT-scans, inherent wood features): Uses unique wood features for identification. CT-scans are accurate but require investment in specialized equipment, more orientated towards traceability in sawmills.

SINTETIC integrates RFID and/or punched codes when doing harvest operations and fingerprinting for traceability inside the sawmill for cost-effective tracking through a unique geodatabase. While RFID offers scalability, its implementation costs include durable tag production and reader installations, on the other side punched codes require marker maintenance and an optical reader with a clear view of the mark. QR Codes and barcodes are solutions in between both.

These technologies enhance traceability, harvest and sawmill optimization, digitalization, legal compliance and consumer trust. The optimal approach depends on cost, accuracy, and industry requirements.

Early quality assessment of timber products

Early quality assessment of timber evaluates wood's technical and economic suitability at the earliest stages—standing trees or after harvest— before it enters industrial processing. Quality, defined by meeting end-use requirements (species, aesthetic, strength) is context dependent.

Structural timber grading links stiffness and strength to visual or mechanical assessments based on species and origin. Applying these to standing trees or logs is challenging due to in situ measurement difficulties, hidden defects, localized NDT data extrapolation and variability from sawing patterns. Mechanized harvesting facilitates data capture, but manual methods demand extra effort, hindering standardization of early grading during operations.

Recent advances in sensors and analytics offer in-forest assessment tools: laser scanning, photogrammetry, and image analysis capture stem geometry; NDT methods (drilling resistance, impact-based penetration, screw-extraction) estimate density; sonic techniques assess elasticity and map defects; Mechanical bending devices measure rigidity; and cores samples can be analyzed in the lab (X-ray, NIR, hyperspectral imaging, ultrasound). Post-felling resonance tests estimate elasticity. All methods require calibration and extrapolation and none alone captures the full picture.

Despite these advances, Europe lacks harmonized wood quality definitions and standardized early metrics, limiting adoption. SINTETIC project highlights benefits of early assessment: optimized resource use, improved silvicultural planning, higher yields, efficient logistics reducing CO_2 emissions, strengthened local value chains and rural economic support.

To achieve these benefits requires:

(1) A common framework for early wood quality criteria

(2) Harmonized forest-inventory data integrating quantitative and qualitative measures

(3) Validation through field–sawmill comparisons

(4) Stakeholder education to drive cultural change

(5) Regional quality labels to boost market transparency and value differentiation.