FACULTY OF
BIOSCIENCE ENGINEERING

DEPARTMENT ENVIRONMENT
LABORATORY OF WOOD TECHNOLOGY

SESSION I - FOREST PRODUCTS FOR A SUSTAINABLE FUTURE!

FOREST PRODUCTS FOR A SUSTAINABLE FUTURE IN THE FRAMEWORK OF THE GREEN DEAL

Joris Van Acker | 7 July 2020

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UGent WOODLAB

"The InnovaWood Tribe"
Workshop on the Future of Wood Science and Technology

INNOVAWOOD

INTRODUCTION

Worldwide context

Do we move from 3,5 to > 10 billion m³

wood consumption per year by 2050 ?

Critical parameters:

Standard of living & demographics

Consumption of 0.6 m³ wood per person per year… will increase to **2 m³**?

World population projected to reach **9.8 billion** in 2050, and 11.2 billion in 2100 – says UN

Sustainability based on renewable resources

Wood as a sustainable resource leading to increased demand/use…

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INTRODUCTION

Green Deal

https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Climate pact

https://ec.europa.eu/clima/news/committing-climate-neutrality-2050-commission-proposes-european-climate-law-and-consults_en

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A SUSTAINABLE FORESTRY WOOD CHAIN

SDG

United Nations Sustainable Development Group

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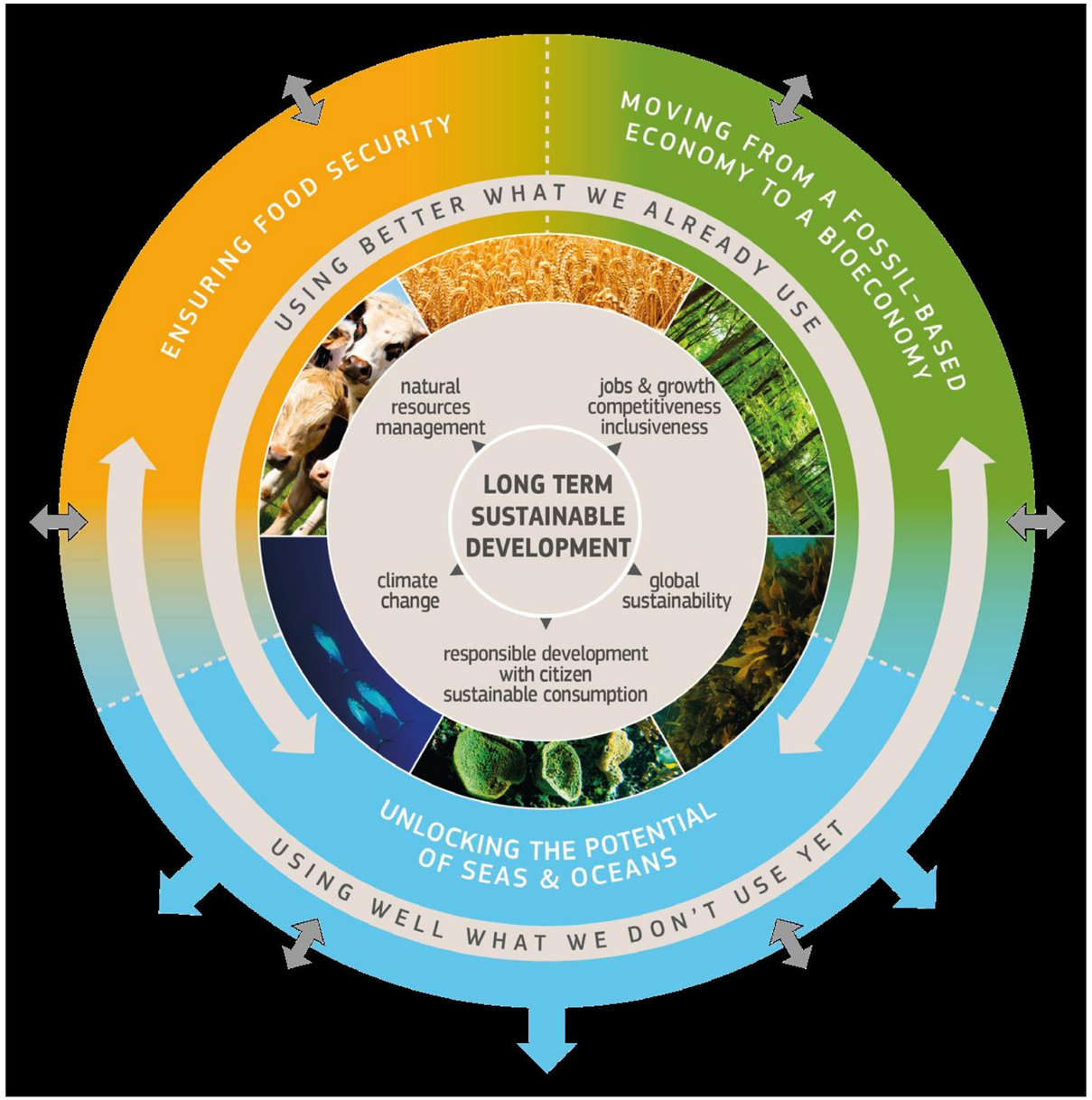
A SUSTAINABLE FORESTRY WOOD CHAIN

Bioeconomy



EC Bioeconomy strategy 2018

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A SUSTAINABLE FORESTRY WOOD CHAIN

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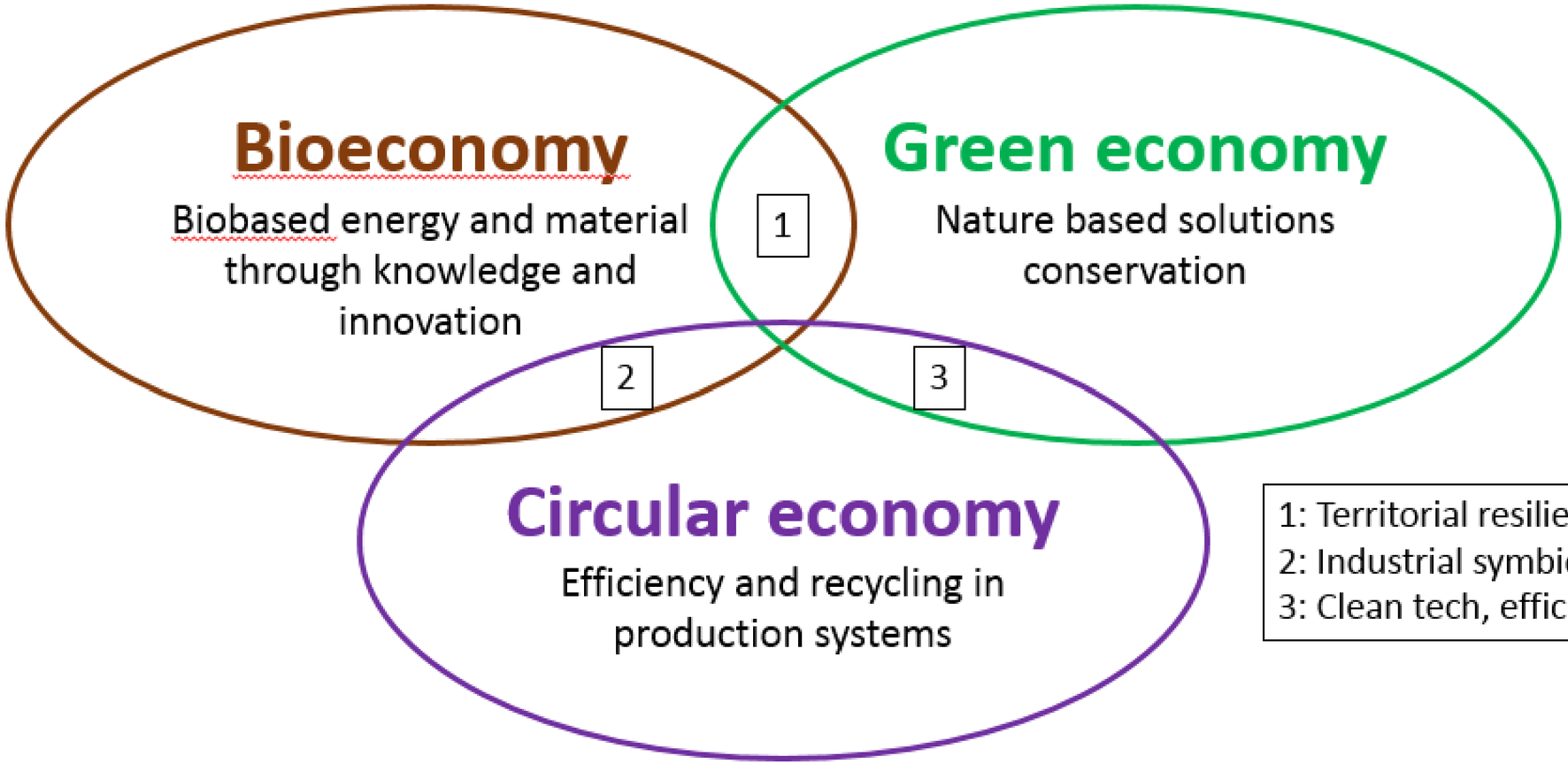

after D'Amato et al. 2017

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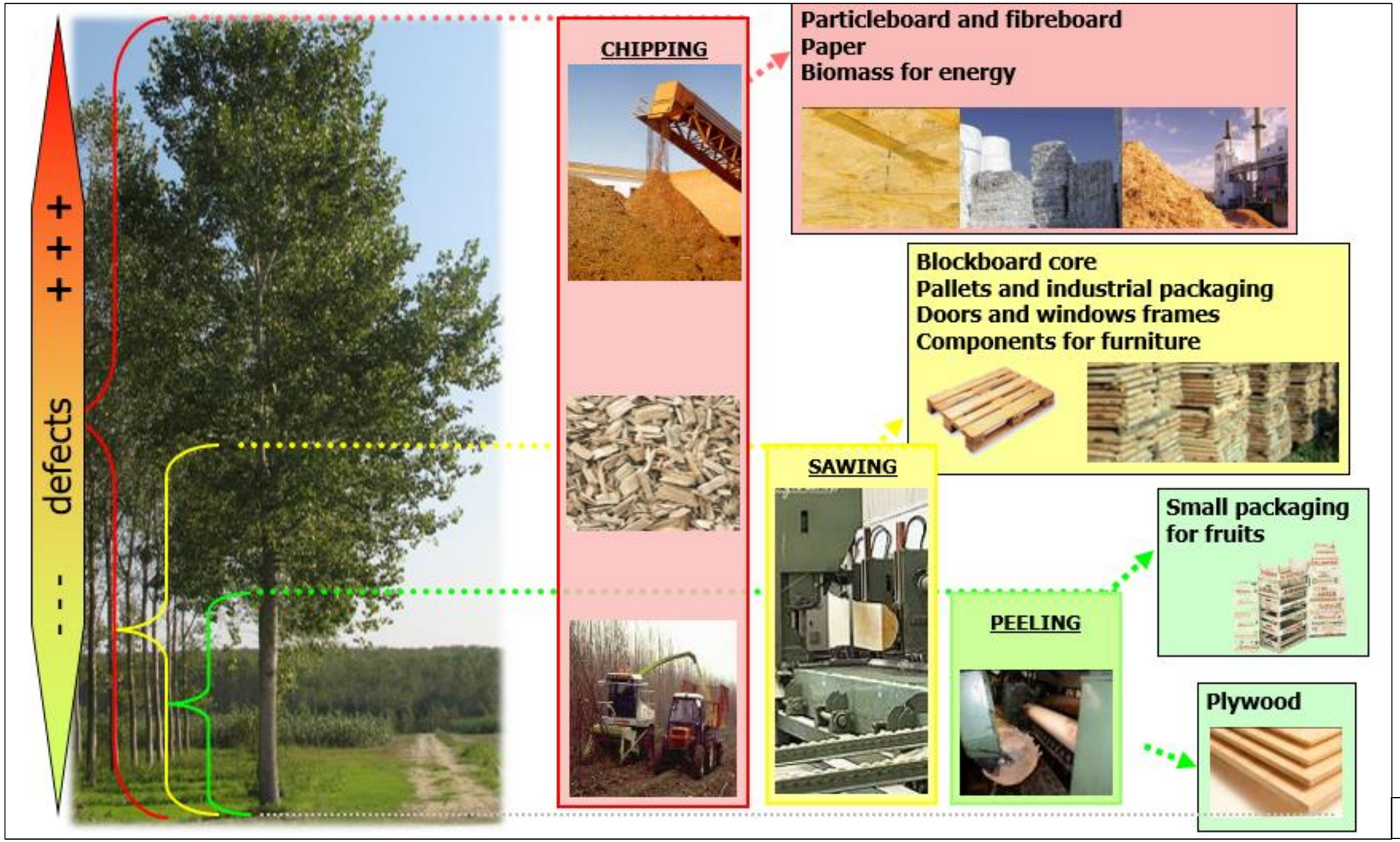
A SUSTAINABLE FORESTRY WOOD CHAIN

Vertical integration and cascade use



Fioravanti 2007

A SUSTAINABLE FORESTRY WOOD CHAIN

Planted forest

Natural forest			Planted forest			Non-forest
Primary	Modified natural forests	Semi-natural forests	Plantations			Trees outside forest (TOF)
		Assisted natural regeneration	Planted component	Productive	Protective	
						
Forest of native species, where there are no clearly visible indications of human activity and ecological processes are not significantly disturbed	Forest of naturally regenerated native species, where there are clearly visible indications of human activity	Intensive silvicul-tural management, e.g. weeding, fertilizing, thinning, selective logging	Forest of native species, established through planting, seeding, coppice	Forest of primarily introduced and native species, established through planting or seeding mainly for produc-tion of wood or non-wood products	Forest of native or introduced species, established through planting or seeding mainly for provision of environmental services	Smaller than 0.5 ha; tree cover in agricultural land (e.g. agroforestry), trees in urban environments, and scattered along roads and in landscapes

Carle and Holmgren 2008
modified and illustrated

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PLANTED FOREST

Brazil: eucalypts, pines,… woody biomass for pulp in tropical regions

PRChina
e.g. Great Green Wall. Shelterbelt with poplar trees in Inner Mongolia

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HYBRID POPLAR CULTIVATION

Poplar, aspen and willow (Salicaceae)

91 percent of poplars grow in natural forests, **6 percent** in plantations and 3 percent in agroforestry systems and as trees outside forests.

Hybrids – **clones** – planted forests – pioneer tree

Poplar plantations: Europe close to **1 million ha** & PRChina over **8 million ha**

Hybrid poplar stand in Belgium

Populus ×canadensis ‘I-214’ stand in Italy

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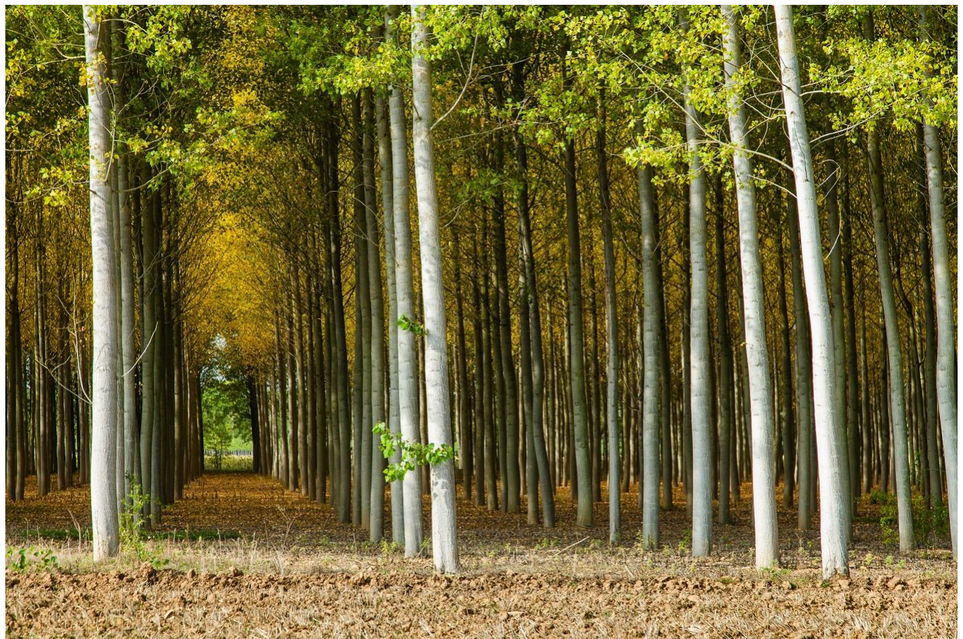
HYBRID POPLAR CULTIVATION

The **International Poplar Commission (IPC)** is one of the oldest statutory bodies within the framework of the Food and Agriculture Organization of the United Nations (FAO), it was founded in 1947. The IPC decided recently (Feb 2019) on a reform to expand focus to become International Commission on **Poplars and Other Fast-Growing Trees Sustaining People and the Environment**.

Working Party on Sustainable Livelihoods, Land-use, Products and Bioenergy

http://www.fao.org/forestry/ipc/en/

IPC
INTERNATIONAL
POPLAR
COMMISSION



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HYBRID POPLAR CULTIVATION

ProPopulus was created in 2008 by an independent group of growers, promoters, companies and organizations that belong to the poplar chain with the end of promoting poplar as a strategic alternative to non-renewable resources, promoting the use of poplar as a local, highly sustainable and renewable source of raw material that plays a key role in developing a European bio-economy.

http://propopulus.eu/en/

PROPOPULUS
NATURE. SOCIETY. FUTURE.
THE EUROPEAN
POPLAR INITIATIVE

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HYBRID POPLAR CULTIVATION

Materials versus bioenergy

Poplars and willows for bioenergy – specific clones and cultivation/harvesting

Multipurpose applications? Integrated wood transformation or specific production for bioenergy

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INTEGRATION HIGH VALUE MATERIAL USE

(1) Looking for **complementary wood resources** from (hybrid poplar) plantations.

(2) Timber construction is part of **green building** and innovative approaches are linked to new engineered wood products, in particular CLT.

BREEAM®

(3) Multiple technologies are now available to **increase service life** of wood products based on low durability hardwoods.

IRGWP

ECWM10

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INNOVATIVE HYBRID POPLAR EWP'S

Vertical integration and potential hybrid poplar EWP's

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INNOVATIVE HYBRID POPLAR EWP'S

LSL (laminated strand lumber) is a typical **North-American** product and is primarily made from long strands coming from **fast-growing aspen** or poplar.

There is a potential opportunity for the utilization of poplars in I-joists, where both the web and the flange may be made of poplar or aspen, for example poplar/aspen OSB and poplar/aspen LVL.

Laminated strand lumber

I-joist

http://www.apawood.org

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INNOVATIVE HYBRID POPLAR EWP'S

Garnica poplar **plywood**

(300000 m³)

Aspen OSB is important in Canada

Bonzano poplar **OSB**

(160000 m³)

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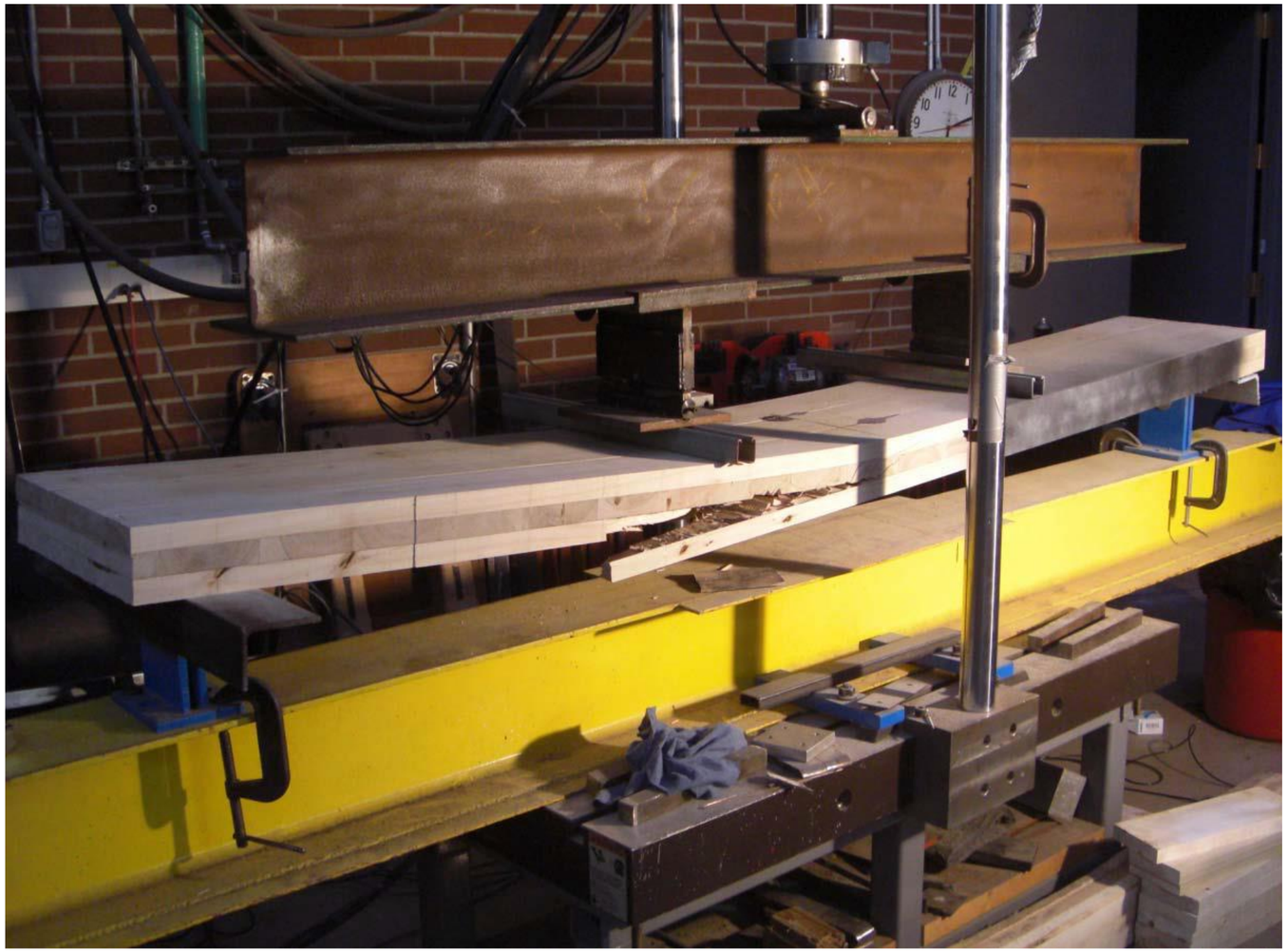
garnica

Challenge the ordinary

BONZANO

INNOVATIVE HYBRID POPLAR EWP'S



Testing hybrid poplar **CLT** at OSU

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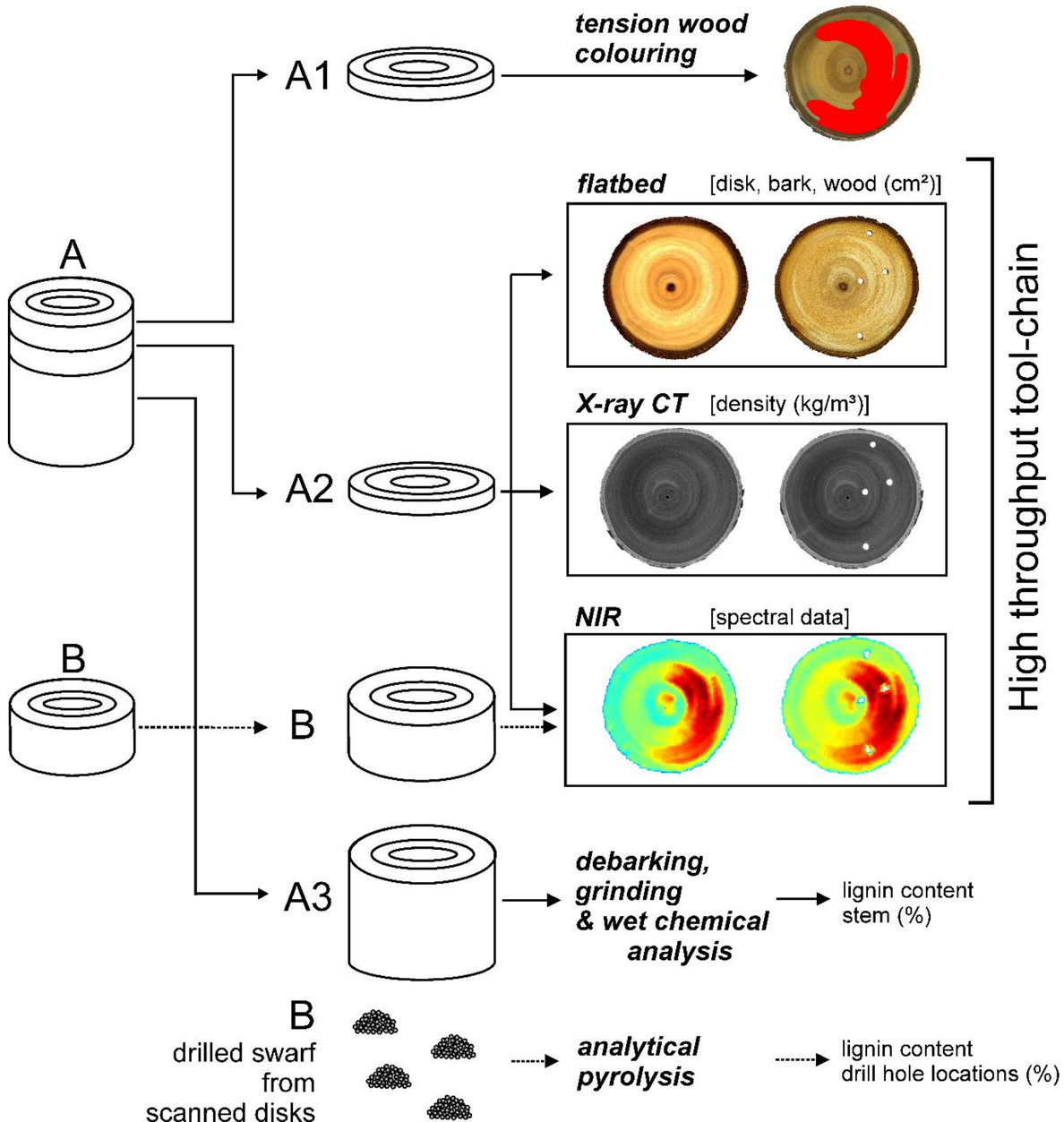
RESEARCH ON ENHANCED PERFORMANCE OF POPLAR

Selection and breeding for wood quality



Defoirdt *et al.* 2017, A generic platform for hyperspectral mapping of wood

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CONCLUSIONS AND PERSPECTIVES

SWOT analysis FWC

STRENGHT: **Sustainability**

Comparison with man-made materials and fossil fuels

WEAKNESS: **Production capacity**

We need 2 to 3 times earth…

OPPORTUNITY or THREAT: **Bioeconomy**

Creative destruction… (revolutionizing the economic structure from within)

Creative innovation (new solutions?)

(nano-)fibres, (natural) fibre composites, 2nd generation biofuels, Engineered Wood Products (e.g. 'hardwood' CLT), wood modification

Decline of some wood products?

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