

EFFECTIVE RAW MATERIAL SUPPLY CHAIN FROM THE FOREST TO BIOREFINERIES

The purpose of this sub-project is to study the whole supply chain from the forest to delivery to a biorefinery. This includes harvest, terrain transport and storage at landing, terminal handling, fractioning and storage of different types of fractionized biomass. Different biomass fractions will be characterized according to their physical and chemical properties. Possibilities to upgrade the biomass already at stump (in the forest) and at landing (road side) will be studied. A comprehensive review of techniques and principles for comminution and mechanical fractioning of forest biomasses will be carried out. The effects of storage of different types of fractionized biomass on their chemical and physical characteristics will be studied.

SUPPLY CHAIN FROM THE FOREST TO BIOREFINERY

The whole supply chain from forest to biorefinery is under study. This includes harvest, terrain transport and storage at landing, terminal handling, fractioning and storage of different type of fractionized biomass. A comprehensive review of techniques and principles for comminution and mechanical fractioning of forest biomass will be carried out. In a following phase a more detailed review on conventional machinery will be done. The results of this machinery review will be used as a background data for system analysis (subproject 4). Characterization of forest biomass terminals will be carried out, the properties, locations and logistics of forestry terminals are studied.

Based on the mechanical principle and machinery reviews, most suitable principles and machinery solutions to comminute biomass are selected. They are studied in real life -scale at landings and terminals. The focus is on productivity, technical availability, energy efficiency, work place operation requirements and quality of the comminuted material and technical settings. These studies are carried out jointly in both Sweden and Finland. Also the same analysis of comminuted material will be carried out in both countries for comparable results.

CHARACTERISTICS OF DIFFERENT BIOMASS FRACTIONS

Different forest biomass fractions are characterized according to their physical and chemical properties, i.e. moisture content, ash content, extractive content, heating value, bulk density and particle size distribution and particle geometry. Also the effects of production technology are taken into consideration. A sampling chart will be developed according to the demands of the different characterization methods. The whole-tree composition by species is shown in figure 1.

The effects storage has on chemical and physical characteristics of different types of fractionized biomass is under scrutiny. It is of key importance to know what effect storage length, season, fractioned tree component and tree species have on the refining characteristics of biomass. Empirical data will be collected on the changing chemical and physical characteristic of the fractions from roadside or terminal handling experiments.

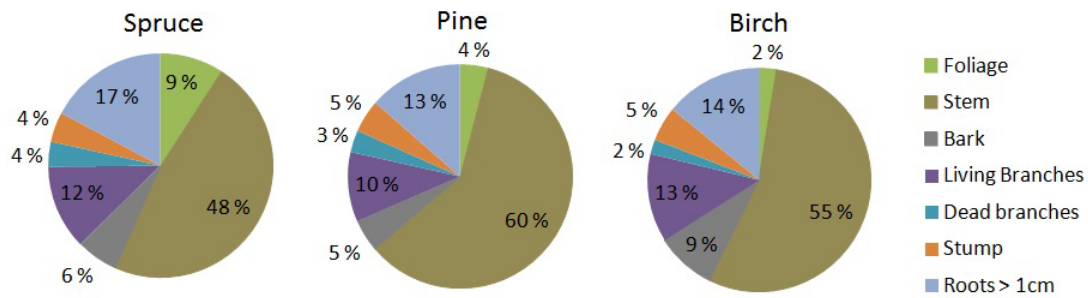


Figure 1. The whole-tree compositions calculated for spruce ($D = 20\text{cm}$, $h = 17\text{m}$), pine ($D = 20\text{cm}$, $h = 17\text{m}$), and birch ($D = 20\text{cm}$, $h = 16\text{m}$). Calculations based on Repola 2008 and 2009.

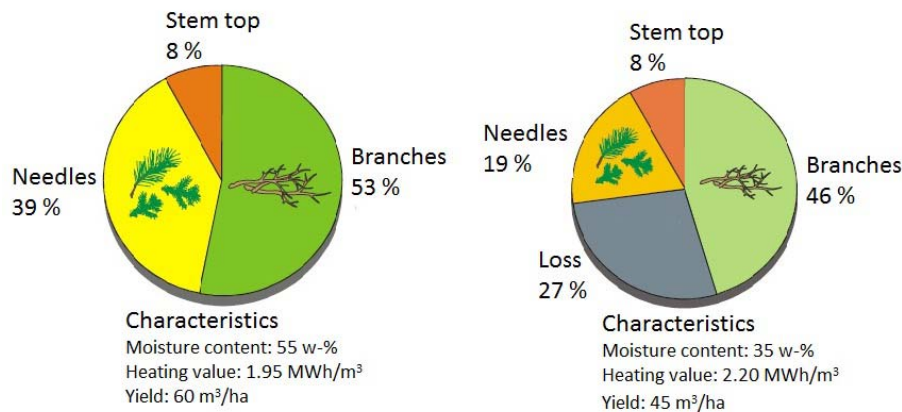


Figure 2. Composition of spruce forest residues, green residue on the left and brown residue on the right (Alakangas et al. 1999).

LITERATURE

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25.9.2012