

Clonal variation in growth and biomass properties of hybrid aspen (*Populus tremula* x *P. tremuloides*) – opportunities for versatile end-uses

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Hybrid aspen (*Populus tremula* x *P. tremuloides*) is one of the fastest growing tree species in Finland. Hybrid aspen studies were initiated in the 1950's. A new breeding program was started in Finland during the mid-1990's with the aim of producing pulpwood with medium length (20-25 years) rotations. Individual hybrid aspen trees, superior in growth and quality, were also selected phenotypically from stands and trials that had been planted during the 1950's and 60's. The selected trees were micro-propagated and planted into a series of field trials.

Hybrid aspen has several potential uses beyond that of pulp production and could be used for several purposes: as a short rotation crop for bioenergy, or with longer rotation times for veneer or sawn timber. Hybrid aspen could also have special uses e.g. in phytoremediation or in production of secondary compounds. For various end-uses, the clonal variation in biomass production and its allocation, as well as properties of wood, bark and branches should be known. Correlations between the various traits are also of importance. Knowledge about variation in nutrient efficiency is needed because high biomass production could entail removal of large quantities of nutrients from the site, but on the other hand could be used to remove heavy metals from the soil.

Seven clones were selected from a 12-year-old field trial located in southern Finland. From each clone, five trees were harvested and samples were taken from stem wood, stem bark and branches to determine basic density, effective heating value, moisture, ash and nutrient content.

The differences between clones were significant for almost all studied properties and was a significant difference between wood and bark values. Wood had lower ash content (0.5% vs. 3.9%), basic density (378 kg.m⁻³ vs. 450 kg.m⁻³) and effective heating value (18.26 MJ.kg⁻¹ vs. 19.24 MJ.kg⁻¹), but higher moisture content (55% vs. 49%) than bark. The values for branches were intermediate between wood and bark. Clonal differences were also significant for the nutrient concentrations of wood, bark and branches and for the nutrient use efficiency of the clones. The results from hybrid aspen suggest that the properties important for energy use could be improved by clonal selection. Correlations between the studied traits and their implications for clonal selection will be discussed.

Keywords: bark, basic density, branches, clonal variation, heating value, hybrid aspen, nutrition, nutrient use efficiency, wood

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Male catkin of *Salix nigra*.

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