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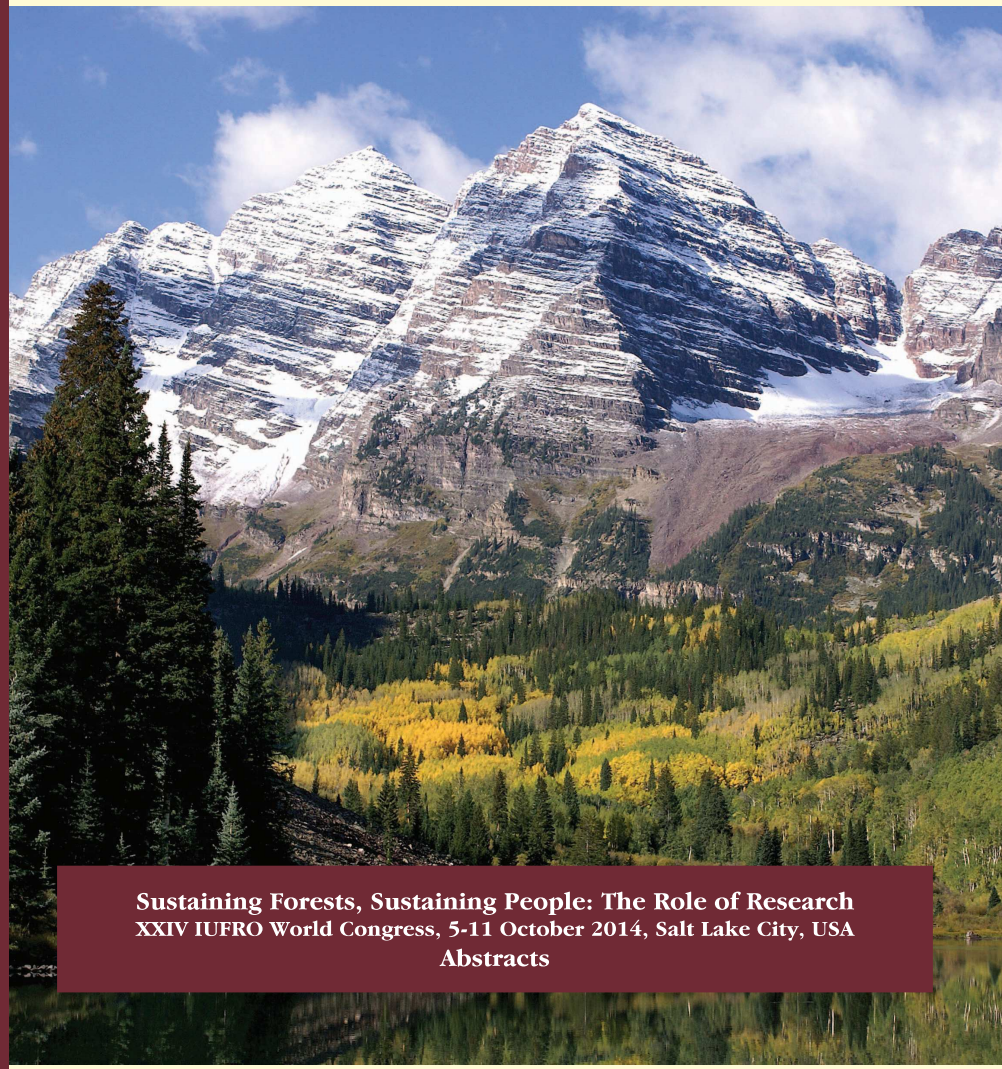

Sustaining Forests, Sustaining People: The Role of Research
XXIV IUFRO World Congress, 5-11 October 2014, Salt Lake City, USA
Abstracts

EDITORS: JOHN A. PARROTTA, CYNTHIA F. MOSER, AMY J. SCHERZER, NANCY E. KOERTH and DARYL R. LEDERLE

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A.A. NAWIR and L. SANTOSO

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The International Forestry Review

Sustaining Forests, Sustaining People: The Role of Research

XXIV IUFRO World Congress, 5–11 October 2014, Salt Lake City, USA

Abstracts

EDITORS

JOHN A. PARROTTA, CYNTHIA F. MOSER, AMY J. SCHERZER,

NANCY E. KOERTH and DARYL R. LEDERLE

Energy biomass production with downy birch (*Betula pubescens*) on cutaway peatlands. Hytönen, J., Jylhä, P. (*Finnish Forest Research Institute, Finland; jyrki.hytonen@metla.fi; paula.jylha@metla.fi*), Reinikainen, O. (*Vapo Ltd., Finland; olli.reinikainen@vapo.fi*), Ahtikoski, A. (*Finnish Forest Research Institute, Finland; anssi.ahtikoski@metla.fi*).

Forest bioenergy is recovered mainly as a by-product of conventional forestry (e.g., under-sized stems, slash, and stumps). As demand for biofuels increases, production of bioenergy in dedicated plantations is gaining renewed interest. Peat is used as a source of energy in many countries in the Northern Hemisphere. For example, Finland has 60 000 ha in peat harvesting area, and ca. 2 500 ha are removed from peat production each year. Due to the high nitrogen content of the residual peat, these sites show high potential for intensive bioenergy production with woody species. However, deficiencies of phosphorus and potassium can limit biomass production. Wood energy plantations could also act as a carbon sink by absorbing atmospheric CO_2. In the present study, biomass production and its profitability with downy birch (*Betula pubescens*), either by natural regeneration or broadcast sowing, were studied. The study showed that the combination of broadcast sowing and ash fertilization results in thickets with high biomass production. However, rotation length (15–30 years) will be much longer than with willows, for example. Coppice regeneration of natural downy birch stands is a cost-efficient alternative, which results in increased biomass production in the subsequent rotation.

Impact of longer-term storage (3–6 months) on forest chip properties. Jylhä, P. (*Finnish Forest Research Institute, Finland; paula.jylha@metla.fi*).

In 2012, 7.6 million m^3 (15.2 TWh) of forest chips were consumed by Finnish heating and power plants. Most chipping takes place during the winter heating season, when consumption of fuel chips is highest. Currently low machinery utilization in summer results in an increased production cost of forest chips. Costs could potentially be reduced by extending operations beyond the heating season. In addition, ensuring a secure supply of forest chips with reserves produced during the thaw seasons is crucial as the demand for biofuels increases. However, the quality of fuel chips decreases with duration of storage. In summer 2013 a field experiment was established in northern Finland to test the quality of whole-tree Scots pine chips and chips made of delimbed Scots pine or aspen. The impact of longer-term storage on dry matter loss and heating value of the forest chips over a 3- to 6-month period was evaluated. Stockpile temperatures and weather conditions were monitored during the follow-up period.

The storage of Scots pine forest chips – CO_2 fluxes as an indicator of dry matter losses. Jylhä, P., Hytönen, J., Alm, J. (*Finnish Forest Research Institute, Finland; paula.jylha@metla.fi; jyrki.hytonen@metla.fi; jukka.alm@metla.fi*).

Fuel chip quality deteriorates with storage duration. As a consequence, long-term storage is not recommended mainly because of the financial losses associated with a decrease in heating values. The high temperatures recorded in stockpiles indicate increased biological activity, which is manifested as loss of material. Forest chips containing foliage are more susceptible to material losses than forest chips made of stemwood. In the present study, a method based on measuring CO_2 fluxes to quantify dry matter losses and CO_2 emissions was tested in northern Finland. The forest chips tested were made of small-diameter Scots pine, either delimbed or undelimbed. A portable infrared gas analyzer was used to measure weekly CO_2 fluxes from several locations within the stockpiles during the storage period of 3–6 months. Carbon losses were derived from a model that included temperature as its driving variable, and the results were compared with the dry matter losses in pieces of cellulose placed systematically in the chip piles. If there is a strong correlation between CO_2 fluxes and material losses, this method would be a novel way to assess the carbon balance of forest chip production systems, as well as the dry-matter losses within the storage period.

Areas of forest required to maintain sustainable, local wood supplies in Pacific Northwest, USA, communities. Keefe, R., Brooks, R., Smith, A. (*University of Idaho, USA; robk@uidaho.edu; rbrooks@uidaho.edu; asmith@uidaho.edu*).

An analysis was conducted to determine how much forested area is required to provide baseline minimum sustainable timber yields to communities of different sizes in a range of northwest U.S. forest types, in order to establish benchmarks for sustainability. The Forest Vegetation Simulator was used to project current Forest Inventory and Analysis (FIA) plot data forward for 60 years under common silvicultural systems in each forest type. The timberland area requirements for individuals and communities of different sizes to supply their own wood locally were established and summarized spatially. Advancing local wood use is an important opportunity to promote forestry among a general public that values local products. Opportunities for communities to procure local wood from private, state, and federal forestlands for sustainable timber production are discussed.

Effects of elemental composition in wood and different tree compartments on the quality of chips for fuel. La Porta, N., Cerasino, L. (*Edmund Mach Foundation, Italy; nicola.laporta@fmach.it; leonardo.cerasino@fmach.it*).

Biomass combustion produces such pollutants as particulate matter, NO_x, and ozone, which severely affect air quality. In this context, the elemental characterization of wood and the element allocation among tree components can provide important information about the quality of the derived wood fuels and give insight into the choice of the most appropriate combustion technique and the right wood fuel for a given combustion technique. Moreover, knowledge of the different concentrations of elements in the different plant tissues can lead to the identification of the best harvesting strategy aimed at producing wood fuel with the lowest possible environmental impact. This work focused on the allocation in three tree compartments (foliage, branches, and stem) of five important macroelements (K, Mg, Ca, N, and P) in Norway spruce (*Picea abies*), and pointed out the possible effects of different harvesting strategies and tree age on the quality of the wood fuels. Results showed that the stem-only harvesting system is preferable to whole-tree harvesting in terms of mineral content loss. Results also showed that it is preferable to avoid biomass from young trees because of the poorer fuel quality of the wood chips.

Mapping of forest disturbance in northeast China using time-series remote sensing data. Li, S., Liu, Q., Li, Z., Chen, E. (*Chinese Academy of Forestry, China; lism@caf.ac.cn; liuqw@ifrit.ac.cn; lizy@caf.ac.cn; chenerx@caf.ac.cn*).

Forest disturbance caused by natural or anthropogenic factors is one of the important drivers of change in the structure and function of forest ecosystems and forest carbon dynamics. The high temporal and spatial variability of forest disturbance events