



Woody Biomass and Carbon Stocks of Natural vs. Restored Mountain Birch (*Betula pubescens*, Ehrh.) Woodlands in South Iceland

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Following a period of land degradation lasting more than one thousand years, Iceland has been undertaken ambitious restoration and afforestation efforts for one century now. Afforestation has also been a central venture of the Icelandic government in order to meet the commitments assigned by the Kyoto Protocol because vegetation represents an important carbon sink. Yet, currently little is known on how much carbon is sequestered effectively in afforested Icelandic woody ecosystems. In order to fill this knowledge gap the “KolBjörk” (CarbBirch), a three year (2008-2011) Icelandic ecosystem research project, was launched.

In this project the development of key ecosystem factors are studied in a chronosequence study of restored birch woodlands, ranging from 0-60 years in age. These factors are: a) forest growth, b) plant communities, c) soil biota, d) soil chemistry and physics and e) carbon stocks and fluxes. Restored woodlands are compared with: a) eroded land, representing the status of the area before restoration and b) original birch woodlands. The aim of present study which is part of “KolBjörk” was to estimate the above- and belowground woody biomass and carbon stocks of old native birch (*Betula pubescens*) vs. restored birch woodlands in South Iceland.

In summer 2009 31 trees (0.1-5.5m height) were measured and excavated and tree inventories (n=519) were established. The excavated trees formed the dataset to establish allometric biomass functions for young, afforested Icelandic mountain birch. The functions were statistically fitted using numerical nonlinear regression using Matlab. Subsequently, forest biomass and carbon stock of the four different old sites were estimated by the newly developed allometric relationships.

The age of the four sites is 10, 15, 60 and 80 years, respectively, while the 80-yr old stand represents a natural grown forest, the others are replanted. The total C-stock in the 10-yr old birch stand was 2.0 Mg/ha, in the 15-yr old 11.0 Mg/ha, in the 60-yr old 87.4 Mg/ha and in the 80-yr old 38.7 Mg/ha. The ratio between long-time above-ground and belowground C-stock increases along the chronosequence from 2:1 to 3:1.

Generally, the results are comparable to studies about other tree species. However, the data collected in this study give a better understanding of the carbon sequestration in Nordic afforested areas.