



Biochar as a possible new tool for afforestation practices

Egle Köster (1), Jukka Pumpanen (2), and Kajar Köster (1)

(1) Institute for Atmospheric and Earth System Research/Forest Sciences, University of Helsinki, Helsinki, Finland, (2)
Department of Environmental and Biological Sciences, University of Eastern Finland, Kuopio, Finland

Planting is considered to be the most important tool for afforestation in conifer-dominated forests of Northern Europe (including Finland). Seedlings are produced in nurseries and can be divided into bare rooted and container plants. Since 1960's mainly containerized planting stock has been produced in Finland for afforestation. The survival of the seedlings after the planting is problematic, as about 20% of seedlings die during the first couple of growing seasons. Thus, from an economical point of view we are facing with quite a big loss of money, as the payments for the planting material and labor are done, but due to survival issues we are losing these investments. One option to improve the water and nutrient retention capacity of soil and growth of seedlings would be to add biochar to the growing media. As in today's world climate change, greenhouse gas emissions and carbon dynamics issues are important, the forestry sector must also take into account these questions, and biochar has been found to be one of the most successful ways to get carbon out of the system and to be stored for a longer period without any other environmental harming consequences.

To estimate possible impacts of biochar on the growth of containerized planting stock, we have established a greenhouse experiment. The main aim was to evaluate whether biochar application to the growing media would affect the growth of tree seedlings during the first year of growing in the nursery.

We have used raw peat as a basic growing media and amended it with biochar (willow). Treatments included control with no added biochar, 5%, 10% and 20% from the volume of the peat was replaced with biochar. We also conducted an experiment to test the co-effect of biochar amendment and fertilizing. For that three sub-treatments were conducted: control with no added fertilizers, and fertilizers used 50% and 100% as in current nursery practices. We tested these conditions on three tree species: Norway spruce, Scots pine and silver birch.

Results of this experiment will allow us to analyze if and how biochar application would affect the need for liming, fertilization and irrigation during the nursery period. We aim to provide for the public (forest practitioner, other stakeholders and general public) practical tools to improve the available afforestation practices and at the same time try to produce a new environmental supportive method.