



Life-cycle assessment of a reed canary grass plantation in an abandoned peat extraction area to mitigate GHG emission

Ülo Mander (1,2)

(1) Uni Tartu, Institute of Ecology & Earth Sciences, Estonia (ulo.mander@ut.ee), (2) Irstea, Hydrosystems & Bioprocesses Research Unit, Antony, France

Järvi Järveoja (1), Janika Laht (1), Martin Maddison (1), Kaido Soosaar (1), Ivika Ostonen (1)

(1) University of Tartu, Institute of Ecology & Earth Sciences, Estonia (ulo.mander@ut.ee, jarvi.jarveoja@ut.ee, janika.laht@ut.ee, martin.maddison@ut.ee, kaido.soosaar@ut.ee, ivika.ostonen@ut.ee)

Abandoned peat extraction areas are continuous emitters of greenhouse gases (GHG); hence, abandonment of peat extraction areas should immediately be followed by conversion to an appropriate after-use. Our primary aim was to clarify the atmospheric impact of reed canary grass (RCG, *Phalaris arundinacea* L.) cultivation on an abandoned peat extraction area and to compare it to other after-treatment alternatives.

In addition to measurement of GHGs using the closed chamber and gas-chromatograph method, measuring C and N balance in study plots and aboveground and belowground biomass of RCG for the period April 2009-September 2011, we performed a life-cycle assessment for five different after-use options for a drained organic soil withdrawn from peat extraction: (I) bare peat soil (no management), (II) non-fertilised *Phalaris* cultivation, (III) fertilized *Phalaris* cultivation, (IV) afforestation, and (V) rewetting.

Our results showed that on average the non-fertilised and fertilised *Phalaris* alternatives had a cooling effect on the atmosphere, whereas afforestation, rewetting, and no management alternatives contributed to global warming. The main components influencing the global warming potential of different after-use alternatives were site GHG emissions, carbon assimilation by plants, and emissions from combustion, while management-related emissions played a relatively minor role. The results of this study indicate that, from the perspective of atmospheric impact during following 10 years, the most suitable after-use option for an abandoned peat extraction area is cultivation of RCG. For the long term effect, dynamics of *Phalaris* production and carbon sequestration in soil must be taken into the consideration.