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# Peat composition and land use as indicator to greenhouse gases emission on peatland

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During the current study we estimated CO2, CH4 and N2O emissions from the different types of peatlands (virgin state of peatland, cultivated peatland with Vaccinium species) and determined the soil chemical composition and plant cover with accompanying species.
The main goals of the paper are: (1) to present the experimental results of greenhouse gases generation and peat chemical composition relationships on different microsites either on natural plant cover or Vaccinium species cultivation area on exhausted milled peat area; (2) to discuss how peat soil quality contributes to greenhouse gases emission and what kind relationship reveals between low input agricultural activites of Vaccinium species on exhausted milled peat area.
From earlier published reviews and studies is reported that the annual CH4-C and N2O-N fluxes for Estonian rural landscapes are 25,519 and 11,050 t respectively. The largest CH4 emitters in Estonia are peatlands (17,746 t CH4-C year$^{-1}$; 60%), CH4 makes up 13.2% of the emission of the total emission of greenhouse gases (Mander et al. 2010).
The quality of peat soil will influence its production capacity, which is one of the most important indicator and motive force for different processes in soil. It is known that biochemical compounds of soil, root exudates, the products of the decomposition of plants have important influence on mineralization and may affect the availability of nutrients necessary for growth of plants. In our previous works the Vaccinium species cultivation technologies and peat chemical composition accordingly (plants growth parameters, plant nutrients together with different agro-chemical indices) were analyzed for the background information.
For the study are selected exhausted peatland nearby Ilmatsalu (58°23'N, 26°31'E) in South Estonia, inside of which the three microsites are determined. Microsites are differed from each other by exploitation and plant cover type. 1). Natural plant cover, 2). Cultivated area with Vaccinium angustifolium x V. corymbosum, 3). Cultivated area with Vaccinium angustifolium. The determined soil type according to WRB was Fibri Dystric Histosol. The main part of study focuses on the analyses of greenhouse gases. For this purpose the closed chamber method was used, the soil temperature and moisture were recorded at each microsite. The greenhouse gas samples were collected from spring to autumn 2010 throughout the vegetation period and analyzed in laboratory by GC. In June 2010 the soil samples were collected and chemical composition analuzed for Ntot, Corg, dry matter and ash content. Also, the water extractable phenolics were measured and reported as gallic acid (GAE). The method of Van Soest was used to determine cellulose and lignin content. Along the microsites the ratios of carbon to nitrogen (C/N) and of lignin to nitrogen (L/N) are determined. As an average the higher CO2 and N20 emissons rates were recorded from microsite where V.angustifolium was cultivated. The same microsite produced lowest emission of CH4. The natural site produced the highest rate for CH4 and lowest emission of N20. The water extractable phenolics content at microsites varied from 17.0 to 32.2 mg-1 GAE 100g. On natural area with typical bog plantcover of Ledo-Pinetum the phenolics content remained lowest and highest content was found at area where Vaccinium angustifolium x V. corymbosum is cultivated. Based on preliminary results we may conclude that greenhouse gas emissions is dependent on the specific pedo-ecological conditions.