

CO₂ Emissions from off-site horticultural peat samples

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INTRODUCTION

Canada is the 7th largest peat producer in the world (2011) with a total of 1.12 million tons/year (USGS, 2011). The end-use life of the products is mainly for soil improvement and potting soil ingredients which have shown a growth spurt in the last few years. Cearly et al. (2005) examined greenhouse gas (GHG) emissions from the Canadian peat industry and suggested that the decomposition from end-use products can represent up to 70% of total emissions. However, no detailed quantification has been provided yet.

From 2015, National GHG Inventories will be required to include emission estimates associated with the off-site use of peat. The IPCC (Intergovernmental Panel on Climate Change) Guidelines for National Greenhouse Gas Inventories present a methodology and parameters to estimate the emissions from the end-use horticultural peat products. Given the high uncertainty in the default IPCC parameters used to develop emission estimates associated with the off-site use of horticultural peat, this study aims at developing country-specific parameters through laboratory analysis of representative samples of peat products from the Canadian peat industry.

The results of this project will be used to develop off-site emission estimates compatible with Tier 2 reporting and will contribute to methodology improvements for country-specific parameters related to the Canadian peat products.

The specific objectives are to:

1. Determine the carbon (C) content of 26 horticultural peat products (pure and mixed) provided by three different Canadian peat companies (Fig. 1).
2. Evaluate peat decomposition rates of these products from incubation experiments,
3. Estimate the most important environmental parameters for CO₂ emissions potential./year.

RESULTS

- Results show a significant difference in the bulk densities and C content between the pure peat sample and mixed with perlite and/or vermiculite (Fig. 2).
- The C/N ratios differ according to the geographic origin of the samples across Canada (Fig. 3).
- Moisture content and temperature are the two main variables explaining the differences in decomposition and emissions (Fig. 4).
- Peat composition has also a significant influence on emission rates (P value = 0.0048) while the geographic region has not (Fig. 5).
- Figure 6 shows a decreasing CO₂ emissions trend through time regardless of temperature.
- The addition of fertilizer does not significantly increase the CO₂ emissions compared to non-fertilized ones
- Figure 7 present the cumulative value for CO₂-C emitted from the peat for the period of incubation.

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DISCUSSION

The fertilized samples did not show any distinction over time and may be attributed to the small position from end-use. The results of this project will be used to develop off-site emission estimates compatible with Tier 2 reporting and will contribute to methodology improvements for country-specific parameters related to the Canadian peat products.

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Fig. 1: Peat sample provenance by region. Mixed samples can contain perlite, vermiculite, dolomite, calcic limestone, wetting agent and/or fertilizer.

Fig. 2: Mean dry bulk density (a) and carbon content (b) of all the samples grouped by their types.

Fig. 3: Mean C/N ratio grouped by the origin of the different samples.

Fig. 4: Comparison between the moisture content (a) and carbon content (b) of all the samples grouped by their types.

Fig. 5: CO₂ potential (µg C/ g C / d) for each moisture and temperature classified by the type of peat product.

Fig. 6: CO₂ potential (µg C/ g C / d) for each temperature versus time.