Implementing circular economy principles in the use of horticultural peat products and reducing associated greenhouse gas emissions in the LULUCF sector

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Actual emissions from the use of horticultural peat revealed

Study was performed on the volumes, using practices and after-use of extracted horticultural peat, processed and used in Estonia, and the resulting greenhouse gas fluxes. During the study, the change in carbon content, biomass production and greenhouse gas emissions associated with the use of growing peat, both in the laboratory and among substrate users, were experimentally measured. The results were compared with previous studies, assessments and the experiences of other countries in order to provide recommendations for supplementing LULUCF calculations

CONCLUSIONS:

IPCC 60% vs Estonia 47,4%

The study concluded that compared to the **IPCC default value (60%)**, the actual carbon content of horticultural peat in **Estonia** is **significantly lower (47.4%)**. Consequently, in most countries the emissions related to the use of horticultural peat are estimated to be higher than they are theoretically possible.

The carbon loss is 2% per year

The conducted peat substrate decomposition experiments showed that during the average period of use (1year) – the carbon loss is 2% of the original organic carbon content of the substrate peat. Thus, the **carbon loss** in the form of greenhouse gases **during** the **direct use of horticultural peat is modest.** The carbon loss occurs almost entirely as carbon dioxide, and the emission of methane and nitrous oxide is insignificant.

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CONCLUSIONS:

98% of carbon stays in soil

~98% of the carbon originally contained in peat moves to the soil during after-use. In Estonia, for example, the peat reaches the soil with the roots of the planted culture (~31%), composted (~6%), or directly from the greenhouse to the field (~12%) or to the open-air garden soil (~48%) and during afforestation with tree seedlings (~3%). It is estimated that only 0.15% of used horticultural peat ends up in municipal waste in Estonia.

30% of carbon remains stable in the soil

The latest studies in Canada indicate that the cradle-to-grave decomposition rate of horticultural peat is 0.6% of carbon per year and the rate of decomposition slows down over the life cycle of the material. In a 100-year perspective, it can be estimated that ~30% of the carbon contained in peat does not decompose and remains stable in the soil.

Double reporting

Peat products annually transfer a larger amount of carbon to the soil in the country of consumption than is lost during decomposition. Since the countries where peat products are consumed do not report the transfer of peat products (organic amendments) to the soil, but report the change in the carbon stock of the soil, double reporting occurs with regard to horticultural peat. On the one hand, peat producers report the change in their carbon stock, on the other hand, consumers of peat products also report the same change later.

150-200 million t CO_2eq over-reported

Since 1990, 150-200 million t CO2 eq. have been cumulatively over-reported in the European Union because of this. Since some of the peat remains permanently in the soil of the country of consumption, it is appropriate that emissions related to peat production are reported in the country of production, but emissions related to horticultural peat would be reported in the country of consumption. From the European Union's perspective, this is a carbon transfer, not a change in the carbon stock or an emission.

SUMMARY

Further research needs to focus on a more precise understanding of the carbon cycle changes associated with horticultural peat use, specifically the additional long-term carbon sequestration from the atmosphere that is achieved through an improved soil fertility. For example, each additional 1% increase in soil organic carbon content up to 4% increases biomass/yield by 10-30%. It remains to be clarified whether the carbon sequestered by the additional biomass increment compensates partially, completely the emissions from peat production (on-site) and peat decomposition (off-site), or even exceeds it.

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