

Soil Improvement Fibres – Carbon removals from Finnish agriculture

Short Description

Soilfood Ltd is circular economy company. We create sustainable food chain by processing industry side streams to fertilizers and soil amendments for agriculture.

When a farmer uses Soil Improvement Fibres, this creates carbon removal in an arable land. One tonne of fibre product binds 50–130 kg CO₂ eq. to soil.

Carbon removal credits created on Finnish fields to be now on sale for the first time.

Long Description

Soilfood is a circular economy company, whose goal is to replace virgin raw materials with recycled materials in large volumes and quickly. At the same time, we work in co-operation with our customers to reduce emissions and create carbon removals in the soil.

We create sustainable food chain by processing industry side-streams to fertilizers and soil improvers for agriculture. We add novel value to the circular economy by selling the first carbon removals from Finnish agriculture. Revenue from the sale of carbon removals is divided into three parts: one for the farmer, one for the industrial operator and one for Soilfood, as it takes all involved parties to ensure that the recycling of side streams and creation of carbon removals is possible.

This way we make the sustainable choice more competitive.

How are the carbon removals achieved?

Soil Improvement Fibres are carbon-rich soil amendment products that are manufactured from pulp and paper industry side-streams. Typical fibre application of 25–50 tons per hectare adds multiple tons of slowly decaying organic carbon to soil.

The carbon removal is achieved by increasing the soil carbon stock with fibre application. When fibres are used as soil improvers, a proportion of the inert organic matter contained in the Product is stored in the soil carbon pool as durable carbon compounds.

Without the soil amendment use the side streams would be incinerated by pulp and paper mills, releasing all the carbon (C) contained in the organic matter into the atmosphere. In Finland, **90 % of these side streams are still incinerated.**

Novel carbon removal methodology

The decomposition of organic carbon contained in the Soil Improvement Fibres is modelled with Yasso-model (<https://en.ilmatieteenlaitos.fi/yasso>), which is developed by Finnish Meteorological Institute and used by Finnish authorities for calculating Finland's greenhouse gas inventory. Only

the proportion of carbon that is stored in the soil for 20 years or more is considered as a carbon removal. This way the carbon that decomposes during the fast decomposition phase after application is not included in the carbon removal.

In other soil carbon removal schemes globally the soil carbon sequestration credits are issued based on shorter crediting periods, ranging between 5 and 20 years depending on the project.

Economic acceleration impact

Our aim is to make the sustainable choices competitive for farmers and for industry. That's why we share the revenue with them.

Revenue from the sale of carbon sinks is divided into three parts: one for the farmer, one for the industrial operator and one for Soilfood. **This makes it even more profitable for the farmer** to use Soil Improvement Fibres. At the same time, **it creates strong economical driver** that shifts the side stream utilization in industry from incineration to circular use.

Co-benefits

Soil Improvement Fibres add significant amounts of carbon into the soil. For farmers it means better soil fertility, higher yields and lower need for chemical fertilizers. Research by Natural Resources Institute Finland estimates that increasing soil organic carbon content by 1 % **increases cereal yields** by 600 kg per hectare*. Improving soil health by organic carbon addition increases resilience of food production towards changing climate conditions.

In addition to soil carbon sequestration, use of Soil Improvement Fibres **reduces greenhouse gas emissions from agriculture**. Soil Improvement Fibres emission factor for N₂O, most significant greenhouse gas from agriculture, is estimated to be 50 times lower than for chemical fertilizer**. Using Soil Improvement Fibres also benefits soil microbiota and increases soil biodiversity***.

Fibre applications has been proven to be one of **the most effective way to reduce nutrient leaching from farmlands**. Soil Improvement Fibre application halves phosphorus leaching*** .

- Concentration of suspended solids in leached water was reduced by 59–77% in the first year and by 32–74% in the second year after treatment. After four years, the reduction was 31–64% compared to the control treatment.
- Phosphorus leaching decreased by 43–50% in the first year and by 37–63% in the second year. After four years, phosphorus leaching was 28–54% lower than in the control treatment ***.

*Salo et al. 2019. Orgaaninen aines maaperän tuottokyvyn kulmakivenä -ORANKI-hankkeen loppuraportti.

https://mmm.fi/documents/1410837/0/Oranki_Loppuraportti+%281%29.pdf/eea8d7fa-083c-5b0a-a50b-9428fbc58c16/Oranki_Loppuraportti+%281%29.pdf?t=1622196952110

** Charles et al. 2017. Global nitrous oxide emission factors from agricultural soils after addition of organic amendments: A meta-analysis.

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*** Rasa et al. 2021: Pulp and paper mill sludges decrease soil erodibility

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