Measures against peat degradation and greenhouse gas emissions

The biochemical process

Aerobic

Bacteria break down peat with the assistance of oxygen.

This process releases greenhouse gases.

At lower groundwater levels, oxygen penetrates further into the soil.

This can result in the release of more greenhouse gases.

Anaerobic

When the groundwater level is high (and when there is flooding), other bacteria break down peat without oxygen.

This releases methane.

When the groundwater level is at or below around 20cm, this methane is largely converted back into less harmful CO_2.

In oxygen-free or low-oxygen conditions, nitrous oxide can also be released. Methane and nitrous oxide are stronger greenhouse gases than CO_2.

Factors
that impact on peat degradation

At higher temperatures, bacteria are more active and more greenhouse gases are produced.

Bacteria that break down peat aerobically require moisture as well. The amount of moisture in the soil impacts the rate at which the peat breaks down.

A slightly higher pH value stimulates peat degradation, while a lower pH value inhibits it.

The groundwater level determines how far oxygen is able to penetrate the soil.

Clay particles, the type of peat, fertiliser and other factors can also impact on peat degradation.

Wet crops

Cranberry

A food crop that can grow with limited drainage, under acidic conditions, and with virtually no fertiliser.

Miscanthus

A fibre crop that grows with limited drainage and without much fertiliser.

Cattail

Cattail cultivation can release methane. The level of methane emissions seems to partly depend on the amount of fertiliser used.

Peat moss

Peat moss could potentially capture net CO_2. It grows with water up to ground level.

It may be that these crops release low levels of both methane and CO_2; further research is required.

Groundwater level

Summer

A concave groundwater level is caused by factors including water consumption by plants and evaporation.

Concave

Bacteria are more active at higher temperatures. The groundwater table is often concave in this situation. The two effects reinforce each other and greenhouse gas emissions increase.

Winter

In colder periods, there is a precipitation surplus and reduced water consumption by plants.

Convex

(Pressure) drainage makes the water table less convex.

Measures that reduce peat degradation.

Ditchwater level

This increase is slow, as the water has to penetrate the land via pores.

Ditchwater level increase

Groundwater level is higher, but remains concave.

Underwater drainage

Infiltration pipes that are located below ditch level and run from the ditch into the ground.

When the ditchwater level is low, oxygen is still able to penetrate far into the soil.

Groundwater level is flatter.

Pressure drainage

Pressure drainage uses the water level in wells.

Independent of the ditchwater level.

Groundwater level is even flatter.

Combination

A combination results in more greenhouse gas reductions.

Factors

The impact of measures depends on a range of factors including:

Drain distance

Soil permeability

Soil measures

To increase the effect, changes can be made to the soil.

Clay

Applying clay particles to the soil and washing them in.

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