Summary Biomob Masterclass 2: Feedstocks from wetter ways of farming

Programme Masterclass

- 14h-14h05: Welcome and introduction
- 14h05-14h10: Recap 1st Biomob session

Seaweeds

- 14h10-14h25: Presentation by Jaap van Hal (TNO Seaweed Lab)
- 14h25-14h50: Questions and discussion
- 14h50-14h55: Short break

Peatlands

- 14h55-15h05: Peatland introduction by Platform Duurzame Biobrandstoffen
- 15h05-15h20: Case studies Paludiculture by Hans Schutten (Wetlands International)
- 15h20-15h45: Questions and discussion

Breakout sessions

- 15h45-16h: Brain storming session and idea exchange
- 16h: End of Masterclass

Introduction

In the previous Biomob we discovered that a significant amount of abandoned agricultural land is present in Europe. This unused land can provide the opportunity of filling in the high demand for sustainable feedstocks used in bioenergy and -fuel production. The presentation of professor Berien Elbersen of Wageningen University made clear that within the framework of sustainable biofeedstocks of abandoned lands, the focus should lie on establishing and pursuing win-win situations. As agricultural lands are mostly abandoned due to socio-economic reasons, local rural communities could benefit from the reintegration of these abandoned lands into the agricultural system. The notion of win-win situations returns in this second Biomob, where we analyse and discuss the potential of mobilising wet biofeedstocks.

Seaweeds

Jaap van Hal of TNO Seaweed Lab showed that the use of seaweed as feedstocks for biofuel production is a realistic option. The main benefit that seaweeds have over conventional agricultural feedstocks is that seaweeds are grown in water and do not compete with food and feed crops over land. There are approximately between 10,000 and 18,000 existing seaweed species with different characteristics and uses. This also means that there is no single concept of a seaweed biorefinery, but rather a multitude of biorefinery options based on the specific characteristics of the seaweed species and habitat at hand.

CE Delft estimated that in the Netherlands a sea area of 5,000 km^2 could be made available for seaweed cultivation, corresponding to a total bioenergy potential of 350 PJ/a. The area that is needed for seaweed production is available and the necessary seaweed production yields have already been achieved with two species, but the value chains themselves are not in place yet. Upscaling the seaweed production would therefore take time as policy support and investments will have to increase in the future as well. Regarding financial incentives, blue carbon credits could play an increasingly important role in the future to fund seaweed projects. Besides providing a bioenergy function, seaweeds can absorb CO_2 and nutrients (such as phosphorus and nitrogen) on a large scale, therefore providing multiple ecosystem services.

In the questions round, Jaap van Hal mentioned the possibility to build multifunctional biorefineries around seaweed valorisation. If seaweed was grown for biofuel production, the contained proteins, antioxidants and minerals would have to be removed regardless, so purifying and valorising these components and selling them to the food and fine chemicals market could establish a significant revenue stream. This could allow making seaweed-based biofuel production more competitive and resembles the business-model of existing conventional refineries.

Peatlands

Peatlands can serve as a natural carbon sink as they store carbon in the soil under natural conditions. This storage of carbon is a result of waterlogged conditions, which prevents plant material from fully decomposing. Large areas of peatlands are located on northern latitudes (boreal and temperate parts), although peatlands are also occurring in the humid tropics. About 84% of the world's peatlands are considered to be natural, or near-natural state and are often abandoned. However, approximately 16% of the peatlands are drained to make them suitable for e.g. agriculture as they have a high nutrient availability. This drainage results in degradation of these lands and transforms the peatland from a carbon sink into a carbon source as a result of oxidation processes. Globally, peatlands emit 2 Gtonnes of CO_{2eq} per year, with 220 Mtonnes of those CO_{2eq} occurring in Europe. To reduce GHG emissions (GHGe) and actively mitigate climate change, these drained agricultural peatlands need to be rewetted once again which counteracts both the GHGe from oxidation processes and occurring land subsidence. However, this does require a different business case on these lands, as former agricultural cannot take place anymore. An interesting business case can be constructed for bioenergy production on these rewetted lands, along with the carbon savings that would results from rewetting. The application of paludiculture, the cultivation of biomass on rewetted peatlands, could bring forth multiple benefits.

Studio gear Up calculated what the bioenergy potential is of the currently drained agricultural peatlands in Europe. Their results show that if a total area of 7.7 million ha in Europe would be used for paludiculture, a total bioenergy potential between 130 and 1,680 PJ could be achieved. This depends on the selection of so-called paludicrops which are suitable to grow on wet conditions.

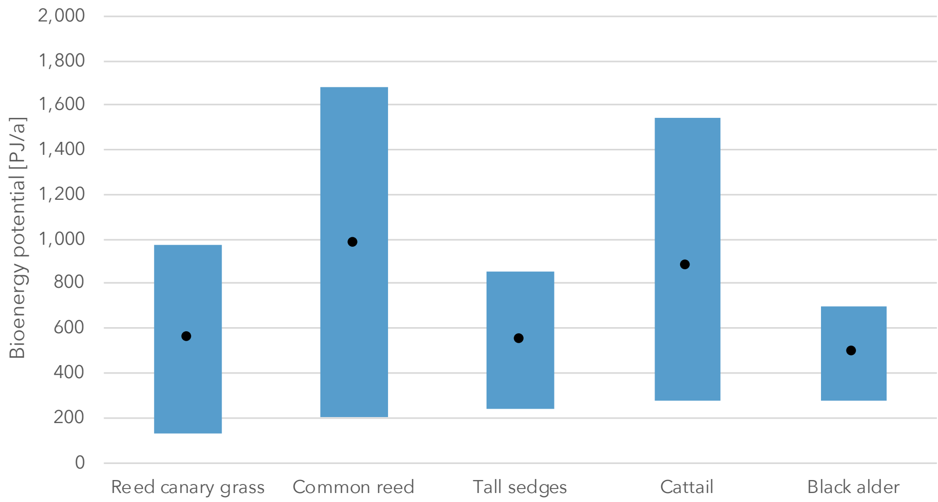

Figure 1: Bioenergy potential Europe for different paludicrops (sGU, 2021)

The rewetting of drained peatlands could also directly benefit local communities, creating win-win situations for all stakeholders. Together with Hans Schutten of Wetlands International, we took a deep dive into three different case studies around the world (Russia, Ireland and Indonesia) where paludiculture positively contributes to the needs of local societies. By rewetting an area of 100,000 ha of formerly drained peatland in Russia, the risk of drained peatland fires was successfully mitigated on over 120,000 ha of land. As another potentially promising win-win situation from paludiculture, Hans Schutten mentioned the recently re-discovered possibility to produce a pain-killing substance from the bark of willows which can grow in peatlands. This creates an interesting opportunity for carbon sink creation via rewetting of drained peatlands, sustainable bioenergy production via the bulk material of a paludiculture of willows, and sustainable high-value chemical production from the bark of the willows as a main revenue.

In Indonesia, purun from cattail (a common peatland crop) is commonly used for a multitude of products, such as building material, clothing, food, fodder and furniture. However, many peatlands are actively drained for pulp production to eventually produce viscose for the textiles export sector which is more profitable. This practice drastically exposes local communities to higher risks of flooding. Via close collaboration with the government, Wetlands International was able to sustain high water tables in certain regions and disincentivise peatland draining. In the questions round, it became clear that this project required the proactive initiative of Wetlands International. More communication and science-based argumentation is required to make more players take the initiative on rewetting peatlands.

In the breakout rooms session, two groups actively discussed and explored how to find more win-win situations for biomass production and mobilisation. Interesting projects and anecdotes have been shared among the participants and future collaborations have developed. Some participants stressed the future need of moving away from single-purpose biofuel production plants to more integrated and multifunctional solutions that simultaneously cater more markets.