GRowing Advanced industrial Crops on marginal lands for biorEfineries

Rendicontazione

Informazioni relative al progetto

GRACE

ID dell'accordo di sovvenzione: 745012

Sito web del progetto

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Progetto chiuso

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Periodic Reporting for period 4 - GRACE (GRowing Advanced industrial Crops on marginal lands for biorEfineries)

Periodo di rendicontazione: 2021-06-01 al 2022-12-31

Sintesi del contesto e degli obiettivi generali del progetto

The BBI demonstration project “GRowing Advanced industrial Crops on marginal lands for biorEfineries” (GRACE) demonstrated and improved miscanthus and hemp biobased value chains starting from biomass provision on abandoned, low-productive and contaminated areas until final production of biobased products.

The goals of the project are to produce biobased products with a strong market potential, to guarantee a reliable and affordable supply of sustainably produced biomass, and to better link biomass producers with the processing industry.
In order to avoid competition with food and feed crops, miscanthus and hemp are cultivated on areas that are abandoned or less favourable for food production due to lower yields or pollution by heavy metals.

The GRACE project aimed to develop the knowledge needed for commercial upscaling of miscanthus and hemp biomass production on lower grade marginal lands and connect the biomass produced with a range of end products via demonstration cases.
The GRACE consortium involved a close collaboration between breeders, growers and downstream industry who together will match new cultivars with specific end-uses.

The GRACE project is contributing towards the goal of transforming the European economy into a sustainable bioeconomy. Thereby, the GRACE project is especially focussing on provision of sustainable produced feedstock and linking complete value chains from biomass production to the final biobased product. To ensure the sustainability and avoid negative impacts on environment and society, all value chains are monitored by environmental, social and economic life-cycle assessment tools. Shifting the fossil based economy more towards a bioeconomy is part of an integrated strategy to address societal challenges, such as climate change, while helping to create new jobs especially for rural areas.

Lavoro eseguito dall’inizio del progetto fino alla fine del periodo coperto dalla relazione e principali risultati finora ottenuti

The novel seed-based miscanthus hybrids showed their competitiveness compared to the standard clone Miscanthus x giganteus. Such novel hybrids broaden the genetic diversity in the crop miscanthus to minimize risks for pests and diseases.
Further the novel hybrids outperformed the standard cultivar especially under challenging and marginal conditions showing their improved drought resistance and high potential to productively use such areas. Valorisation of such areas provides options for income diversification for the farmers and rural economies, while minimizing risks of land competition for food or feed production.
The establishment of the GRACE fields was performed during challenging weather conditions, which proved that novel agronomy using mulch film was suitable to mitigate establishment risks and is suitable for novel seed-based hybrids.

Industrial partners were making considerable progress in demonstrating the bio-based value chains.

Several novel bio-based products developed by industrial partners during the GRACE project are meanwhile available on the market, including composite material for the automotive sector from ADDIPLAST, mycelium interior design elements from MOGU, pharmaceutical cannabidiol (CBD) from INDENA, and several lightweight concrete applications using miscanthus from MISCANTHUSGROEP. Other products are going to be available on the market very soon, including formaldehyde-free, 5-hydroxymethylfurfural (HMF)-based resin as binder for the wood and furniture industry from AVA, bio-based, biodegradable agricultural plastic applications from NOVAMONT such as mulch films and plantings pots, and pelargonic acid as bioherbicide from NOVAMONT.
Miscanthus fibre fractionation developed by GIEßEREITECHNIK KÜHN proved to be a key technology for material application, since this allows to produce miscanthus fibre fractions of specified parameters and qualities with minimum energy demand.

The environmental, social and economic sustainability of all bio-based products within the GRACE project has been analysed. It was shown that the bio-based products in general show improved sustainability performance than fossil comparators. However, also hotspots in the different value chains were identified, which allow the involved partners to further improve their processes and their sustainability performance.

Overall, the GRACE project was very successful and very high level of collaboration and cooperation supported the development of Miscanthus and Hemp as feedstock for the European bioeconomy and develop markets for the biomass.
This is creating a market pull which will contribute to convert our economy and society into a sustainable and circular economy.

Progressi oltre lo stato dell'arte e potenziale impatto previsto (incluso l'impatto socioeconomico e le implicazioni sociali più ampie del progetto fino ad ora)

The partners of the GRACE project are working to progress beyond the current state of the art in crop production and biomass conversion to expand the future bioeconomy. Expected impacts of the GRACE project are:
- to increase utilization of low-quality arable land (low-productivity, contaminated or unused) and by doing so, minimize the potential for food/fuel competition.
- to demonstrate to potential growers/farmers where the cultivation of hemp and miscanthus are both, economically viable and environmentally sound.
- to incubate innovation in the utilization of the biomass and thereby create new business opportunities for rural areas.
- to reduce import dependency of Europe in energy and chemical sectors, by paving the way for viable options to produce biofuels and bio-based platform chemicals from biomass cultivated on marginal, contaminated or unused land.
- to demonstrate the direct and indirect social and environmental benefits of perennial biomass production and utilization, such as the prevention of soil erosion by soil stabilization on slopes, soil remediation, and an alternative

revenue for currently uneconomic or contaminated farm land.
- to demonstrate that introducing biomass crops in the right places, will increase food security rather than compete with food crop production through long term improvements in soil fertility on depleted, abandoned or contaminated
land for future food production.
- to contribute to the development of the European Bioeconomy by demonstrating the production of novel biobased-products with a high market potential.
The GRACE project thereby contributes to the following Key Performance Indicators (KPI) of the Bio-based Industries Joint Undertaking (BBI JU)/Circular Bio-based Europe Joint Undertaking (CBE JU):
- KPI 2: “Ten new bio-based value chains by 2020”, by demonstration of new biobased value chains (from biomass production to biobased product).
- KPI 3: "A shorter time to market", by setting up new cross-industry cooperation. In GRACE more than 50% of the partners are SMEs, which exceeds the EC H2020 target of 20% SME contribution.
- KPI 4: “5 new building blocks for the chemical industry by 2020”, by demonstration of novel building blocks.
- KPI 5: “Fifty new biobased materials by 2020”, by upscaling of production of new biobased materials.

The GRACE project will contribute to the European Bioeconomy by increasing the biomass production from marginal lands and reducing the cost of crop establishment. This will enable current marginal land in the EU (estimated as 5% of crop land and 10% of grassland), which is at least 3.5% of the area.
The value of the biomass produced from this area, even if it was used as a feedstock for thermal energy, would add an estimated 11bn euro to the economy in the European Union.

Bird view on the field scale trial in Eastern Germany (taken by GTK using an UAV)

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