Project 1: Innovative biomass production systems, harvest and conservation technologies

Project partners: SEGES, Technological Institute/AgroTech, Aarhus University, University of Copenhagen, DLG/Kongskilde, DLG/Sejet, Arla Foods.

VISION

The overall vision is to facilitate a diverse and flexible biomass production sector which can supply biorefineries with a wide variety of agricultural crops and crop residues tailored for biorefinery purposes. We aim to develop a robust all-year biomass supply chain produced under sustainable conditions, optimized land use and reduced costs of production and transport

HOW ARE WE GOING TO DO THAT?

1. By development of innovative multi-purpose production systems, embracing annual and perennial plant species and exploiting the potential of genotypic differences.
2. By extending the crop growing season and exploring plant complementarity.
3. By building IT-models that can manage logistics and changes in biomass quality during storage.
4. By optimizing harvest- and preservation techniques plus inventing new machinery for biomass handling.
5. By sustainably intensifying the biomass yield per unit land area and delivering tailored biomass qualities for biorefineries.
6. By optimizing critical growth stages, plant density, canopy structure, day-length responses, low temperatures, nutrient and water exploitation.

PRELIMINARY RESULTS

- Candidate crops & cropping systems with a large biomass production, a large nitrogen content, and with low nitrate leaching have been identified
- Plants and plant organs with a high protein content and easy protein extractability have been identified
- Molecular markers for straw yield and grain quality have been identified. Plants with a high straw quality and straw yield for biorefinement without compromising on grain quality will be selected
- Strip harvesting (individual harvest of grain and straw) has been investigated as a cheaper harvest method of grain. Potentially also as a method to obtain a higher biomass yield for biogas if combined with undersown catch crops
- Handling and storage of grass fiber after protein extraction are being investigated in order to maintain the quality of the grass fiber as feed or biomass for biogas production
- Economic models for calculation and optimizing of cost in relation to production, storage, and logistics of meadow grass, clover grass, straw and rape straw for biorefinement have been developed
- The business case for production of green protein, cattle feed, and biomass for bioenergy is currently being evaluated

OBJECTIVES

1. Increase the quantity and quality of biomass raw materials available for biorefining.
2. Increase resource use efficiency.
3. Optimize land management, logistics, biomass harvesting and storage.
4. Develop cost-effective management practices for marginal lands to harvest their biomass potential.
5. Understand the fundamental interactions between genotype, environment and management factors that can be exploited.
6. Achieve basic understanding of key factors controlling the productivity and resource-use efficiency of novel biomass production systems.

Top: Experimental and commercial harvesting of hemp, grassland and maize.
Bottom: Examples of activities with strip harvesting for added value of the catch crop biomass.

ALREADY PUBLISHED

- Grøn Biomasse DCA rapport 068, Sep 2015, Termansen et al.
- Biogas production from catch crops: Increased yield by combined harvest of catch crops and straw and preservation by ensiling. Biomass and Bioenergy, May 2015, Molinuevo-Salcesa et al
- Harvest methods, capacities, and costs. SEGES rapport. Lyngvig et al
- Feasibility study of the profitability of new bioenergy harvesting machinery from a farmer and agricultural machine company perspective. BioValue rapport. Scovill et al

For more information on Project 1 including potential collaboration please contact project leader Lone Abildgaard at loa@seges.dk or platform manager Jane Lindedam at lindedam@biovalue.dk. Find more information on BioValue SPIR at www.biovalue.dk