

Action FP0602

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Biotechnology for lignocellulose biorefineries

FPS



<http://viikki.helsinki.fi/CostFP0602/>

Participating countries:

AT, BE, BG, CZ, DK, FI, FR, DE, GR, HU, IL, IR, IT, NO, PT, RO, SK, SL, ES, SE, CH, TR, UK

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Objectives:

- to develop environmentally sound and cost-effective biotechnical tools and production technologies
- to exploit the novel biotechnical tools for the development of new production technologies for fibres, chemicals and bioenergy
- to strengthen the scientific excellence in the area and to disseminate this information to European scientists, industry and other stakeholders
- to stimulate new interdisciplinary scientific networks in Europe, as well as to link nationally funded activities in the focus areas

Working Group 1

The focus is on improving the action of enzymes and microorganisms. Hydrolytic enzymes can be separately used to carry out specific modifications in the fibre substrates to achieve improved processes or product properties, or in concert to enhance the hydrolysis of lignocellulosic biomass into fermentable sugars. Research on the fundamental understanding of the action and further engineering of hydrolytic and oxidative enzymes will be carried out. Of particular importance is the design of novel metabolic pathways followed by advanced fermentation technologies for the production of useful metabolites from renewable raw materials. Fermenting organisms, such as yeast, will be genetically improved to produce higher yields of energy carriers or novel chemical building blocks from carbohydrates present in the lignocellulosic raw materials.

Working Group 2

Enzymatic engineering of fibres focuses on the improvement of present processes or products or design of completely new products. There is a significant potential for an extended use of fibres and other wood constituents for advanced materials and composites. Research on application of new biotechnologies in pulp and paper production will include e.g. flexible manufacturing processes with radically reduced energy consumption or improved recyclability of fibres. Targeted methods for introducing novel functionalities into fibres are of special interest, especially with regard to extending the uses of paper for novel areas, such as carriers for printed electronic circuits or novel consumer products. Other potential new uses include nanocomposites based on cellulose microfibrils or whiskers, and cellulose derivatives for various types of products and diverse applications.

Working Group 3

Research on the production of biofuels and sugar-based platform chemicals will promote a bio-based economy by complementing and substituting petroleum-based raw materials by renewable lignocellulosic raw materials. Chemical products derived from lignocellulosic polymers and components can be used for a large number of applications. The target is to develop methods and applications for both large-volume and special-use products prepared from the main wood polymers, cellulose, hemicelluloses, wood extractives and lignin. Applying various fractionation techniques and improved pre-treatments, as well as hydrolysis and fermentation techniques, the carbohydrates will be more efficiently converted into relevant products. In addition to fuels, various biopolymers are among interesting products.

Main achievements

Networking and dissemination of scientific results. The partners have carried out high quality research on biotechnology and biorefineries and shared their knowledge and results in several meetings and workshops.

New collaborative research projects applied and started. Efficient networking has led to new national and European project applications in the participating research organizations and universities. Especially in the field of enzymology and bioenergy, new research activities have already been initiated.

Young scientists actively involved. A number of STSM's have been successfully carried out resulting in scientific publications and closer collaboration between partners. The ESR have also participated actively in workshops.

Socio-economic impacts will be due to new knowledge leading to the implementation of biotechnical processes for the production of second generation biofuels.