



European Agricultural Fund for Rural Development: Europe investing in rural areas.

SCAR National Meeting in Poland

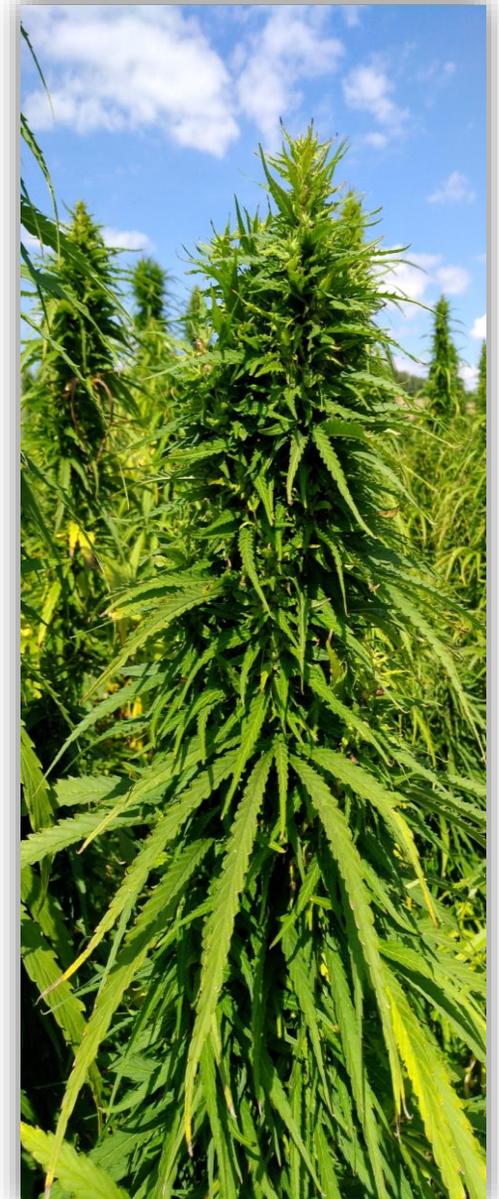
National meeting in Poland disseminating knowledge about the European Commission's Standing Committee on Agricultural Research (SCAR)

BIOFUEL FROM HEMP BIOMASS

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Research team: Batog J. Wawro A. Frankowski J. Gieparda W.

Institute of Natural Fibres & Medicinal Plants



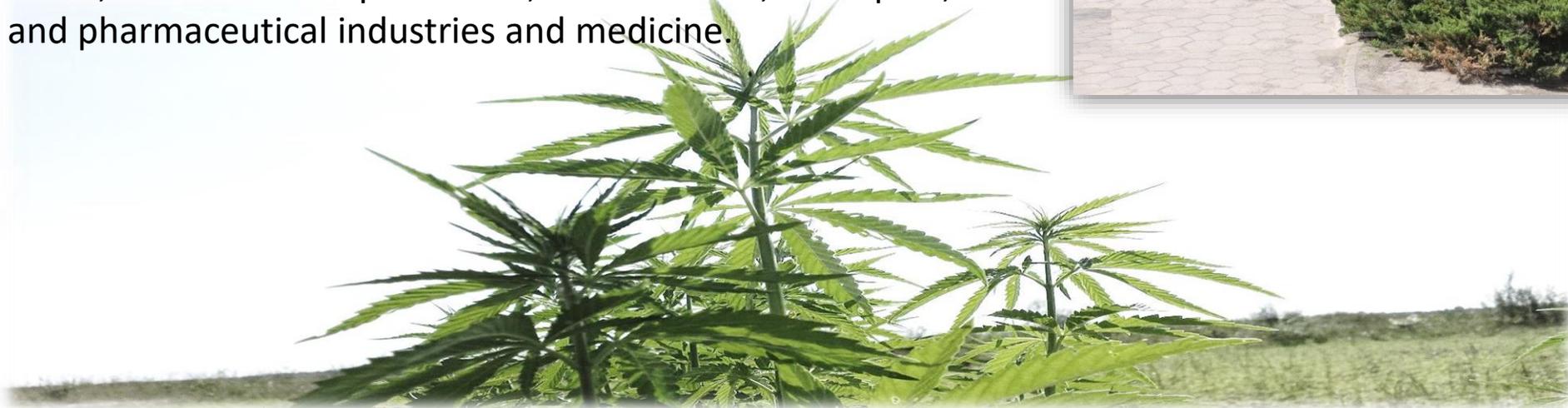
SCAR National Meeting in Poland, Warsaw, 14.11.2018

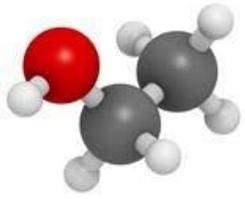
The Institute of Natural Fibres and Medicinal Plants



The Institute of Natural Fibres and Medicinal Plants, Poznan, Poland, is an interdisciplinary research centre with international standing, involved in complex research on obtaining and processing of fibrous and herbal raw materials.

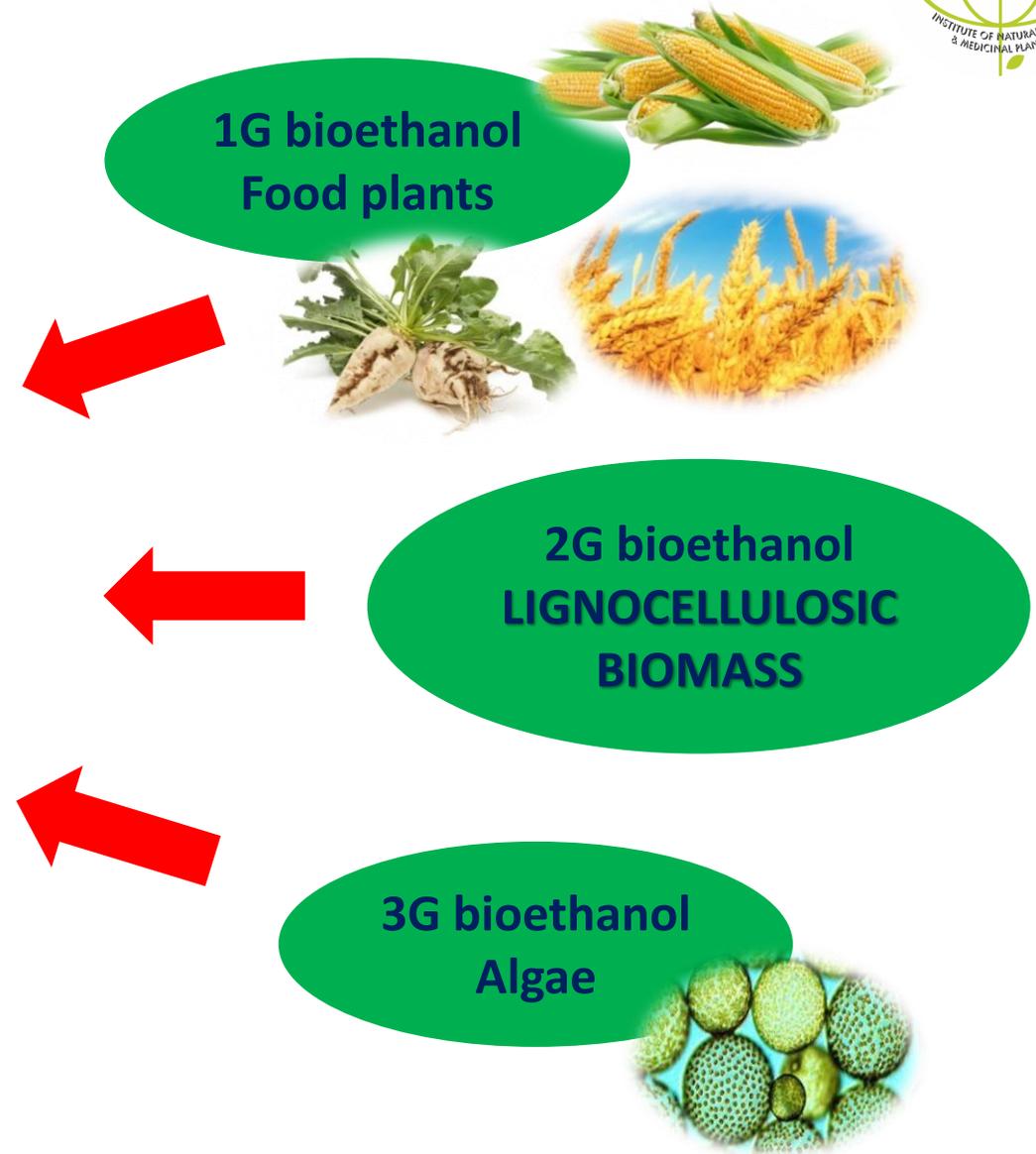
The Institute is involved in a number of national and international research projects; cooperates multi directionally with numerous research centres worldwide; works for agriculture, environment protection, construction, transport, food and pharmaceutical industries and medicine.





BIOETHANOL

- renewable and clean source of energy
- dehydrated ethyl alcohol obtained from vegetable products
- vehicle fuel (specially adapted engines) or addition to gasoline
- chemical, cosmetic and pharmaceutical raw material



Directive of UE 2015/1513 regarding energy from renewable resources

Goal in 2020

- ✓ 10% - content of bio-components in liquid fuels
- ✓ 7% - maximum content of biofuels I generation in liquid fuels
- ✓ 3% - minimum content of biofuels higher generation in liquid fuels

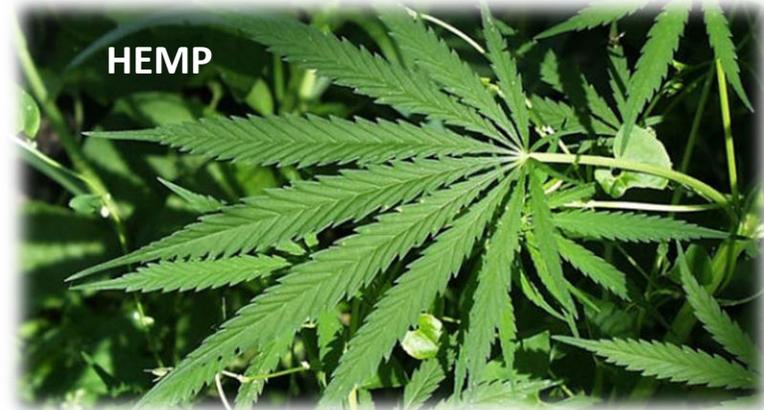


Lignocellulosic biomass

- ✓ polymer complex - lignocellulose
- ✓ difficult degradation



WOOD



HEMP



WILLOW



MISCANTHUS



SORGHUM

HEMP BIOMASS

INDUSTRIAL HEMP - variety of hemp that can be grown in Poland
(content of psychoactive substances THC < 0.2%)

- ✓ annual plant with rapid growth
- ✓ dry matter yield 10-15 t/ha
- ✓ resistant to disease and adverse environmental conditions
- ✓ improving soil quality
- ✓ reclamation of degraded soil
- ✓ reduction of the greenhouse effect
(1 ha of hemp binds about 2.5 tons of CO₂)

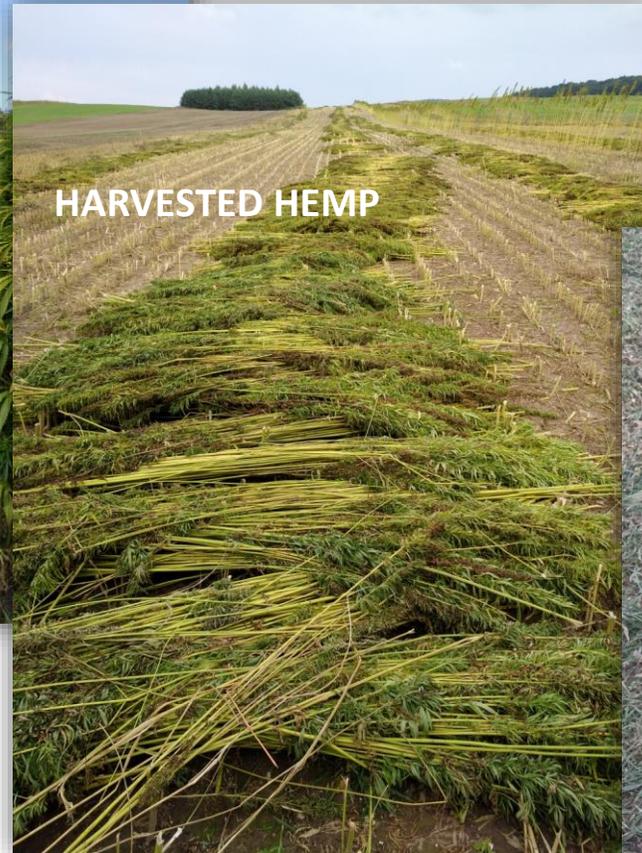


Hemp biomass - application

- ✓ Hemp straw - waste of seed plantations
- ✓ Slow natural decomposition process (lignocellulose)
- ✓ Time-consuming composting
- ✓ A good raw material for the production of biofuels



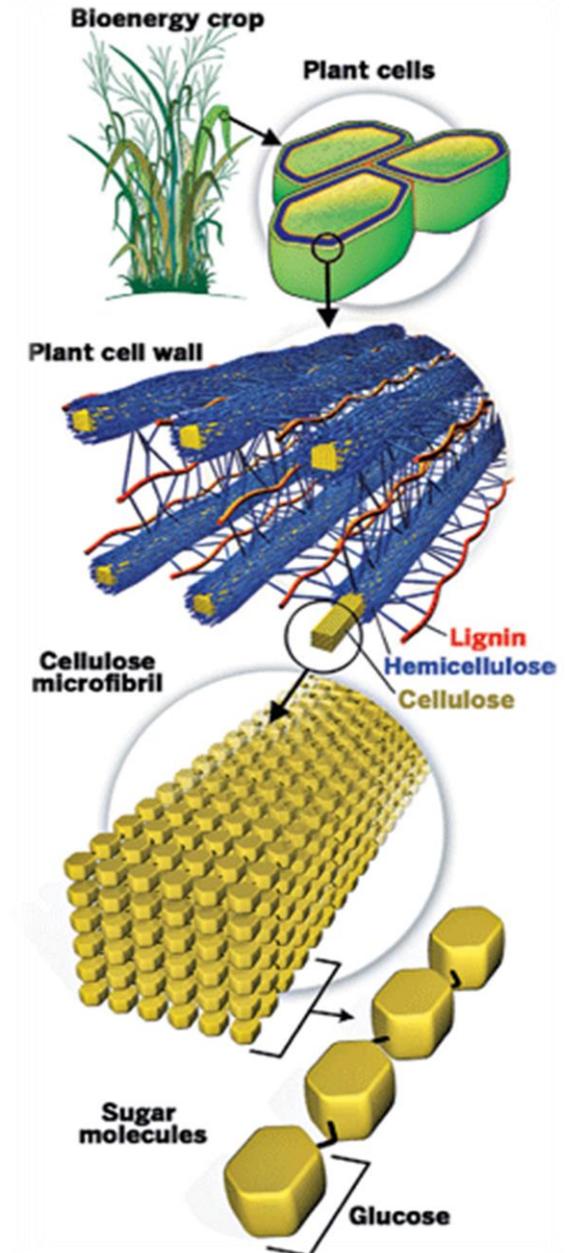
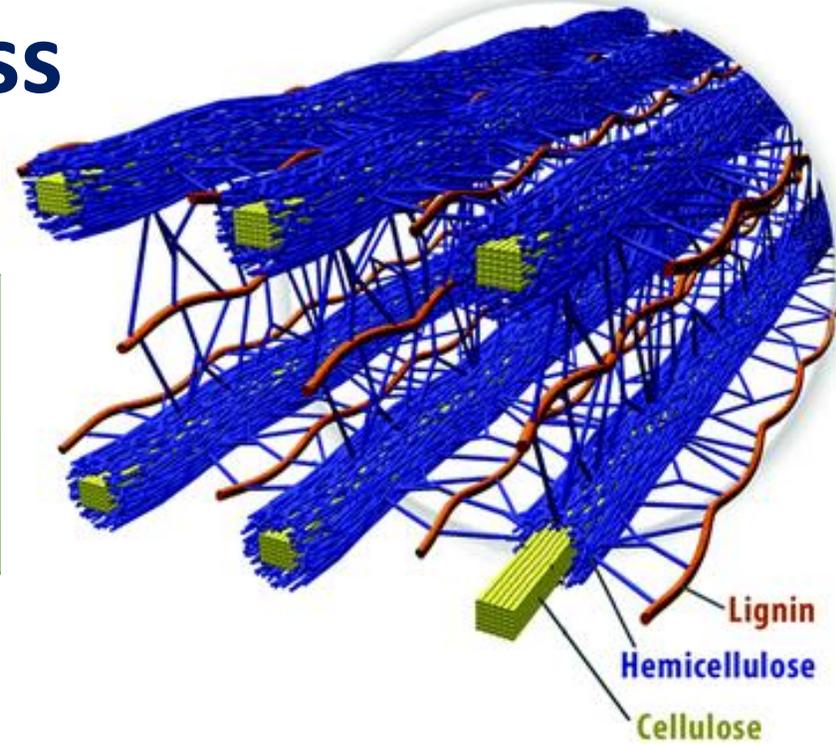
Harvesting straw for the production of bioethanol



Structure of hemp biomass

Chemical composition of hemp biomass

- Cellulose 51%
- Hemicellulose 28%
- Lignin 15%



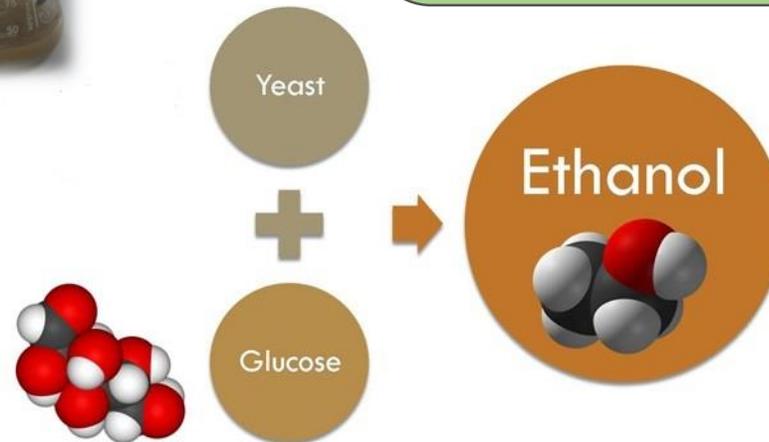
Stages of obtaining bioethanol from hemp biomass



PRETREATMENT

Physical/ Chemical/ Biological

- fragmentation of solid phase
- loosening the compact construction of lignocellulose
- destruction of the crystalline structure of cellulose
- separation of lignin from cellulose



ENZYMATIC HYDROLYSIS

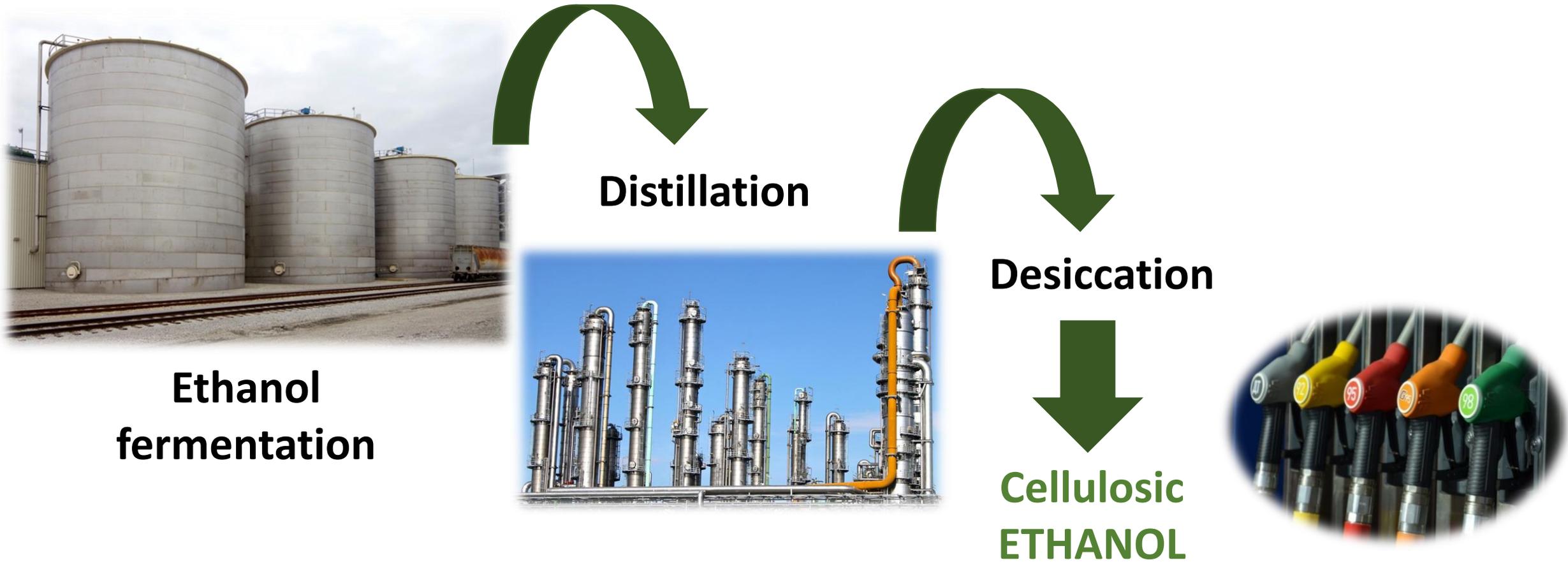
cellulose → glucose

FERMENTATION PROCESS

distillery yeast

Saccharomyces cerevisiae

Stages of obtaining bioethanol from hemp biomass Industrial scale





BIOETHANOL

ADVANTAGES

- + Reduction of greenhouse gas emissions by hemp cultivation - CO₂ and CH₄
- + Renewability of hemp biomass
- + Development of the market for agricultural products
- + Diversification in the fuel sector
- + Limiting the consumption of fossil fuels

DISADVANTAGES

- Technological and investment challenges
- Higher price compared to fossil fuels

RESEARCH FOR BIOECONOMY

LETTER OF INTENTION

Institute of Natural Fibres & Medicinal Plants / LOTOS S.A.



19.09.2018



LOTOS is the Polish capital group whose activity has strategic importance for national and European security in the energy sector, and for Polish economy.

It is an oil company operating both in Poland and abroad, whose businesses consist the upstream and processing of crude oil, as well as wholesale and retail sale of highest quality petroleum products.

Cooperation IWNiRZ with LOTOS S.A.

Implementation of technology of bioethanol production from hemp biomass based on results of research conducted by IWNiRZ within Multiannual Program of Ministry of Agriculture and Rural Development: „Reconstruction and sustainable development of production and processing of natural fibre raw materials for the needs of agriculture and the economy”





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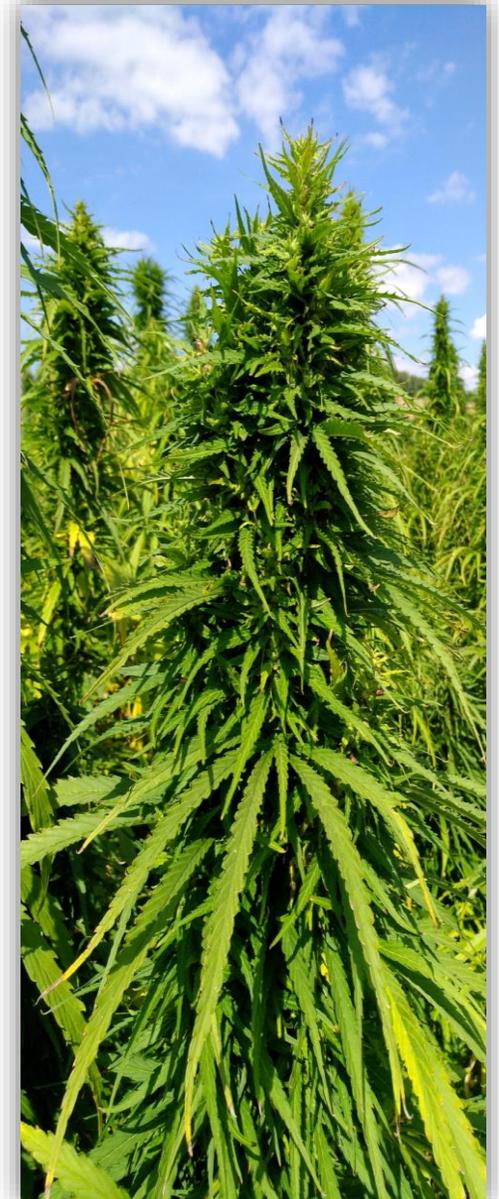
Thank you for your attention

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