

# Biofuels and the Contribution of Plant Biotechnology

Plants for  
the Future

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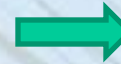
Brussels  
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# The Five Challenges for Plant Biotechnology

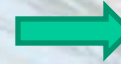
(from the SRA of ETP Plants for the Future)

**Challenge 1: Healthy, safe and sufficient food and feed**



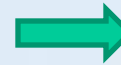
Competition of fuels with food and feed production

**Challenge 2: Plant-based products – chemicals and energy**



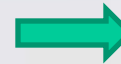
Bioenergy plants

**Challenge 3: Sustainable agriculture, forestry and landscape**



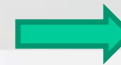
Sustainable production

**Challenge 4: Vibrant and competitive basic research**



Providing novel solutions from plant biotech

**Challenge 5: Consumer choice and governance**



Markets (e.g. EU lead market)

# What can Plant Biotechnology provide ?

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**Plant Biotechnology** does provide

- plants with **novel** properties and improved performance
- new plant lines **faster** through transgenic and non-transgenic approaches
- **heritability** of plant characteristics
- **integration** into the agricultural value chains



Plant Biotechnology is an essential partner for the development of biofuels from plant biomass

- Higher yield
- Improved processibility of biomass
- Lower environmental impact

# Higher Biomass production is urgently needed

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- Higher plant growth rates
  - Improved photosynthesis
  - Improved conversion of assimilates into raw materials for biofuels
  - Higher potential plant growth
  - More effective plant architecture and physiology
- Prolonged vegetative growth
  - Less cold sensitivity (early germination)
  - Late flowering (prolonged vegetative biomass production)
- Less biomass loss through stressful environments
  - Improved resistance against pathogens
  - Higher tolerance against abiotic stresses (drought, salt, heat, cold, etc.)
- Additional arable area
  - Low demand varieties and species

# Improved convertibility and availability of biomass

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- Conversion route specific biomass
  - More accessible cell wall structures for better fermentation
  - Easy crack storage carbohydrates
  - Removal of inhibiting compounds from biomass for biological conversion routes
  - Lowering alkali for better combustion processes
- Logistics of biomass provision
  - Diversity of biomass for longer seasonal availability of biomass
  - Parallel optimisation of plant parts for food and biofuel application
  - Low-demand plants for marginal land

# Low environmental impact

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- Bioproduction
  - Improved resource use efficiency
    - Water, nutrients (esp. nitrogen and phosphorous), light, etc.
    - Nitrogen-fixing plants and beneficial plant-microbe interactions
  - Usability of grey-water for irrigation
  - Production on contaminated and salty land
- Recycling of biofuel wastes (e.g. slurries)
  - Optimisation of nutrient recycling from waste

# Increased Diversity of Feedstocks

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- Development of crop road map
  - Traditional food and feed crops (1st. generation)
  - Development of underutilised species
  - Specific crop rotation and mixture systems
  - Integration of agriculture and forestry
- Development of dedicated energy crops through
  - Genomics-supported breeding
  - Smart breeding and transgenic approaches
  - Novel species – but minimise the risk for the environment

# Sustainable Bioproduction

