working with plants to build a sustainable future

Professor Dianna Bowles
Weston Chair of Biochemistry
Centre for Novel Agricultural Products

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THE UNIVERSITY of York

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living on ancient sunlight

'oil… millions of years for nature to make and consumed in 200 years'

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a solar energy source for manufacturing

photosynthesis

clean technology

sustainable

high capacity

complex chemicals

plants for food, feed for livestock and non-food uses

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plant cell factories make many different products cheaply

starches and sugar

fibres and biomass

oils and proteins

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adenosine triphosphate

ATP

nature's universal solar energy store

'the plants take in one form of power, light and produce another power, chemical difference'

J R Mayer 1842

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plants

plasticity

developmental

metabolic

the plant production system

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solar energy

photosynthesis

the full potential of the plant production system

an extraordinary resource of energy underpinning the bio-economy

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the full potential of the plant production system

land-use decisions

developed world developing world

sustainable production of energy

sustainable use of energy

- GHG emissions
- competition between food / non-food
- biodiversity
- environment
- local economy
- societal well-being

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solar energy

photosynthesis

the full potential of the plant production system

starches sugars oils

fuel food animal feed chemicals

sustainability criteria for production should be applied equally to food and non-food crop production systems

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'importing (or exporting) food is equivalent to importing (or exporting) water' – virtual water

productivity per drop

searching for better options to current starch and sugar crops

plant science ⇄ crop science

drought tolerance… the potential of the sorghums…

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solar energy

photosynthesis

the full potential of the plant production system

searching for better options to current oil crops

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solar energy

photosynthesis

the full potential of the plant production system

the potential of lignocellulose

forestry
agricultural co-products
energy crops
vegetable waste

solar energy

photosynthesis

the full potential of the plant production system

modifying and opening the cell wall to release the energy in lignocellulose

the bioeconomy is more than bioenergy

the vast majority of chemicals are manufactured from petroleum feedstocks

science **photosynthesis** application

FOOD FEED CHEMICALS MATERIALS FUELS

integrated, multipurpose, biorefineries

need for integrated supply chains

raw materials → extraction → processing → manufacture → markets

growers of the feedstocks → users of the feedstocks

the sustainable production and effective use of plants is key to the new bio-based economy

a robust evidence base of science must underpin policy

sustainable development

EC-US TASK FORCE ON BIOTECHNOLOGY RESEARCH

plant-based bioproducts:
creating value from renewable resources

sustainable development

in the epobio project, desk researchers identify and integrate the science, technology and supply chains to realise the full potential of the plant production system

validation is through the analysis of sustainability criteria: placing the science within wider context of environmental impacts, economics, regulatory frameworks and social implications…

the epobio process – a holistic analysis of the issues to provide a thorough evidence-base to inform decision-making by funding agencies and policy-makers

www.epobio.net

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sustainable development

the epobio process - selection criteria for priority 'flagships'

- user / consumer benefit
  societal benefit across the entire supply chain
- scientific challenge
  large-scale, complementary, multinational input
- economic benefits and risk analyses
  the project as a continuum – research to demonstration
- private sector involvement
  pre-competitive, assurance of value and opportunity

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sustainable development

flagship themes selected

plant cell walls | plant oils | biopolymers

environmental impacts, economics, regulatory frameworks and social implications

a communication strategy

enabling world class science and technology to develop sustainable products of high utility to benefit society

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sustainable development

science, technology, innovation

the flagship theme and projects

environmental impacts, economics, regulatory frameworks and social implications

SWOT analysis

or

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science to support policy

The 2006 epobio Workshop:
PRODUCTS FROM PLANTS – the biorefinery future

The 2007 epobio Workshop:
PRODUCTS FROM PLANTS – from crops and forests to zero-waste biorefineries

www.epobio.net

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the full potential of the plant production system

land-use decisions

developed world **developing world**

sustainable production of energy

sustainable use of energy

- GHG emissions
- competition between food / non-food
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- societal well-being

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sustainable production of energy

reduced inputs

increased tolerance

improved agronomy

yield

realising the full potential of the plant production system

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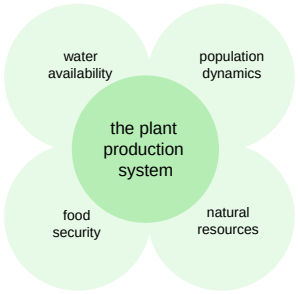
sustainable development



the bioproduct development partnership

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solar energy

photosynthesis

an extraordinary resource of energy underpinning the global bioeconomy