Bio-refineries as a sustainable tool to address food and energy security: A Jerusalem artichoke perspective

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UNIVERSITEIT STELLENBOSCH UNIVERSITY

OUR PROBLEM

POPULATION GROWTH

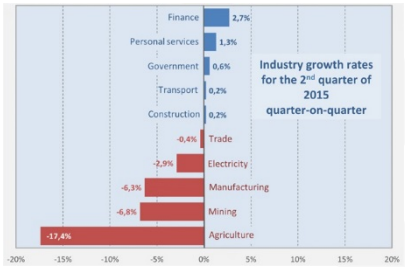
SOURCE: STATISTICS SA

FOOD SECURITY

ENERGY SECURITY

OUR PROBLEM

CONSUMPTION REDUCTION



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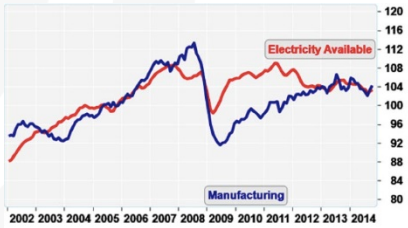
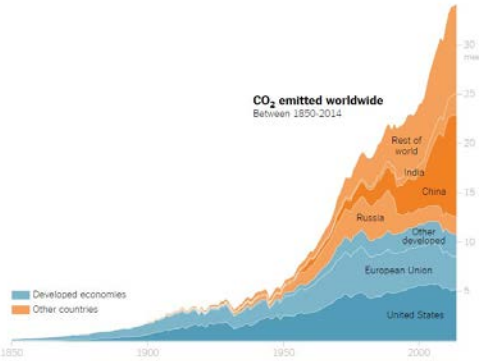
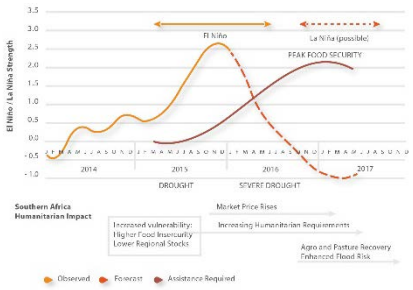


SOURCE: MYBROADBAND

INCREASED DEMAND



SOURCE: COP17



SOURCE: RISCURA

SOLUTION

OPTIMAL ENERGY MIX

- Meet growing demands
- Renewable
- Mitigate global warming

BIOENERGY

1st GENERATION BIOFUELS

- ❑ Food based feedstock
  - Maize
  - Cassava
  - Sorghum
- ❖ Food vs Fuel controversy
- ❖ Food inflation
- ❖ Food security threat

2nd GENERATION BIOFUELS

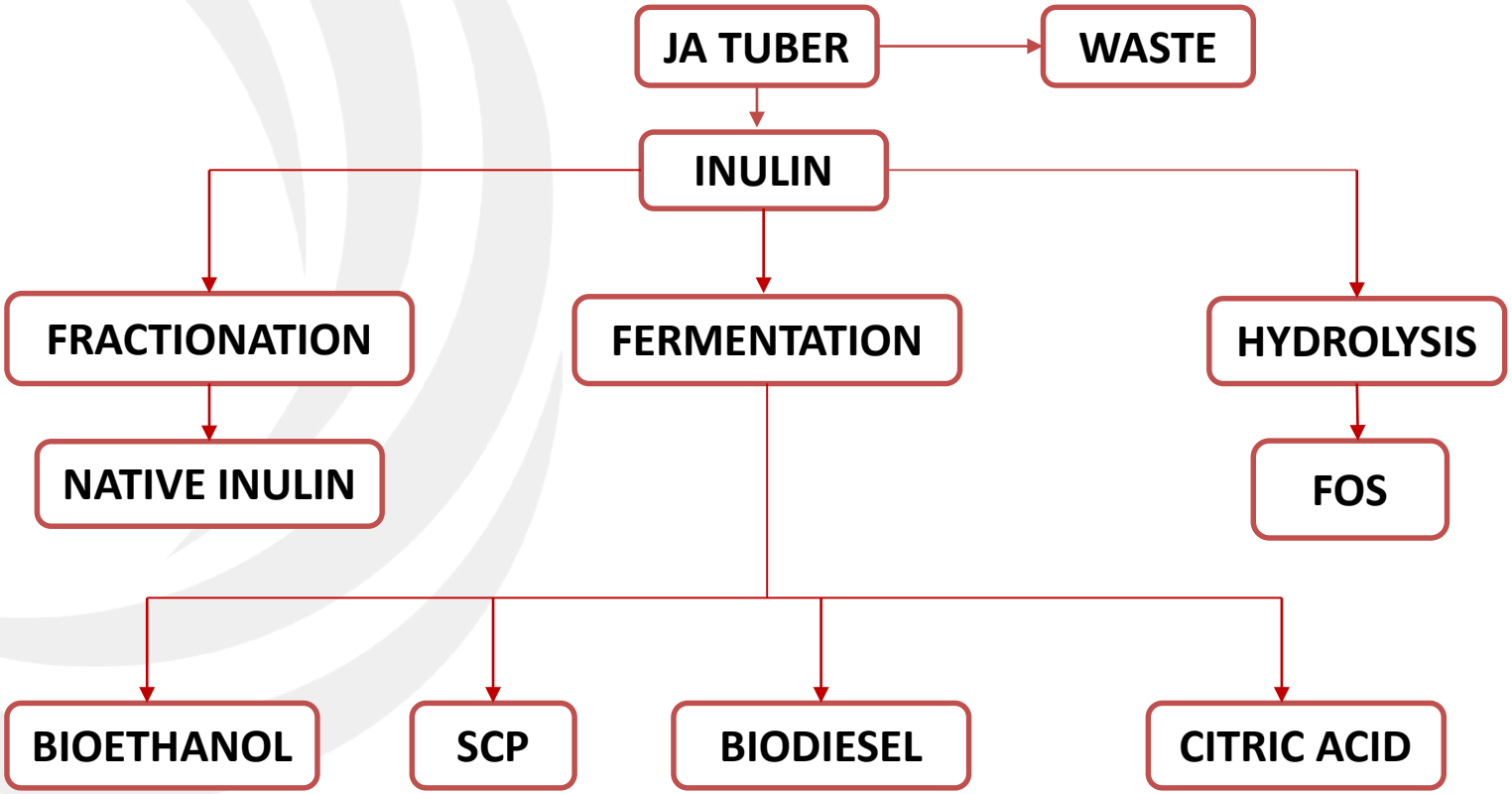
- ➢ Agro-waste
- ➢ Perennial energy crops
- ➢ Multifunctional crops

MULTIFUNCTIONAL CROPS: JA

How to simultaneously and efficiently solve the conundrum?

- Biorefinery (Jerusalem artichoke)
  - Multi-functional crop: Biofuel, food and feed use
  - Good agronomic traits
  - Synergistic benefit for food (inulin/protein) and energy (bioethanol) security
  - Reduction in carbon emission
  - High potential for economic development and poverty alleviation

CONVENTIONAL JA USES



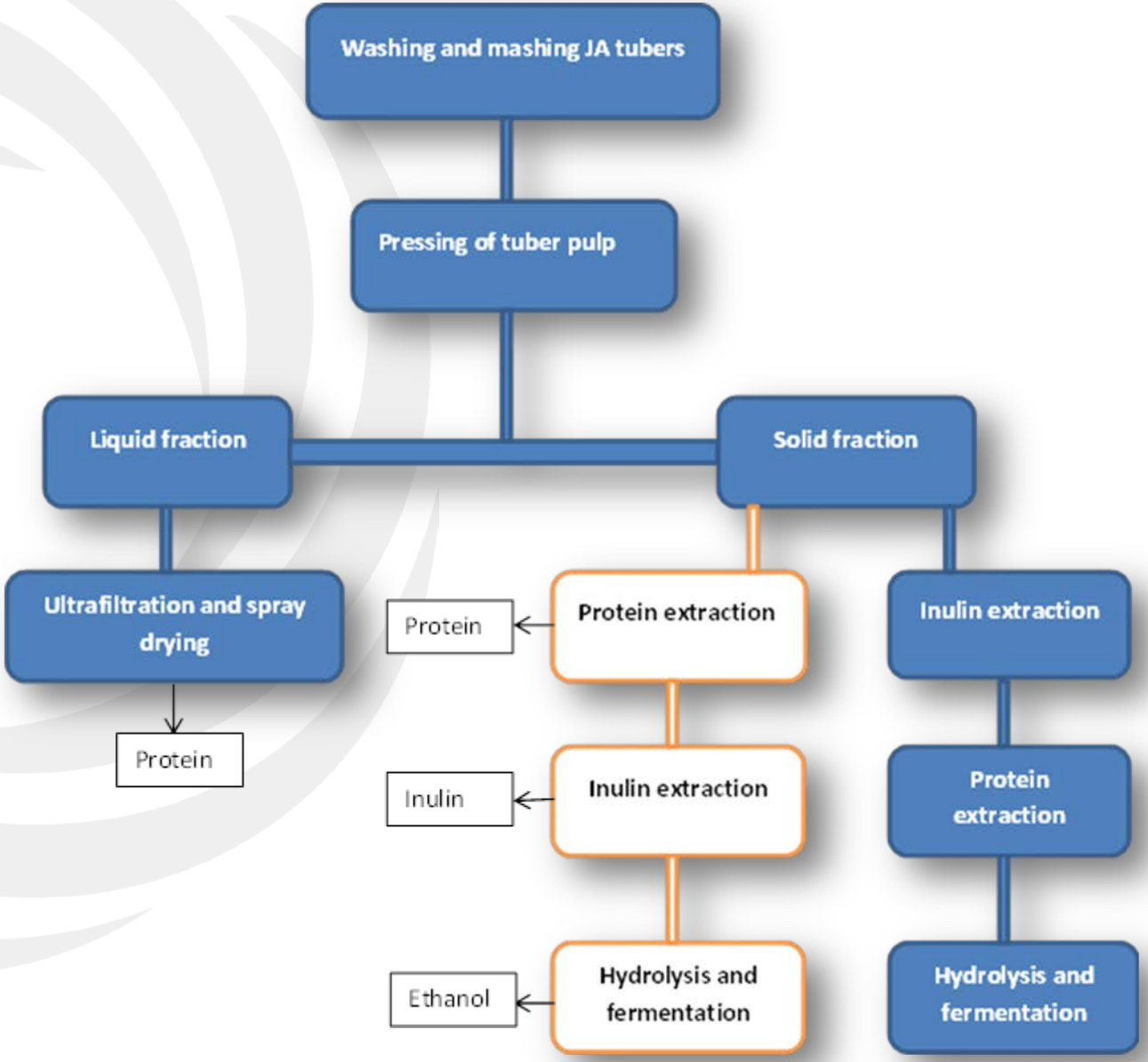
AIM AND OBJECTIVES

Aim: To develop an integrated system for the co-production of food products and biofuel

Objectives:

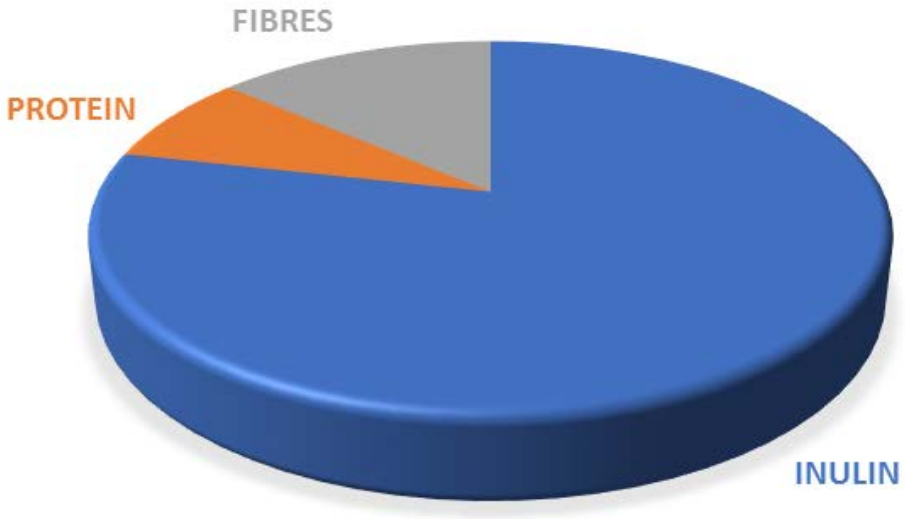
- Integration and optimisation processes for sequential extraction of inulin-protein
- Upgrading of the extraction residue for bioethanol production

OVERALL PROCESS-FLOW

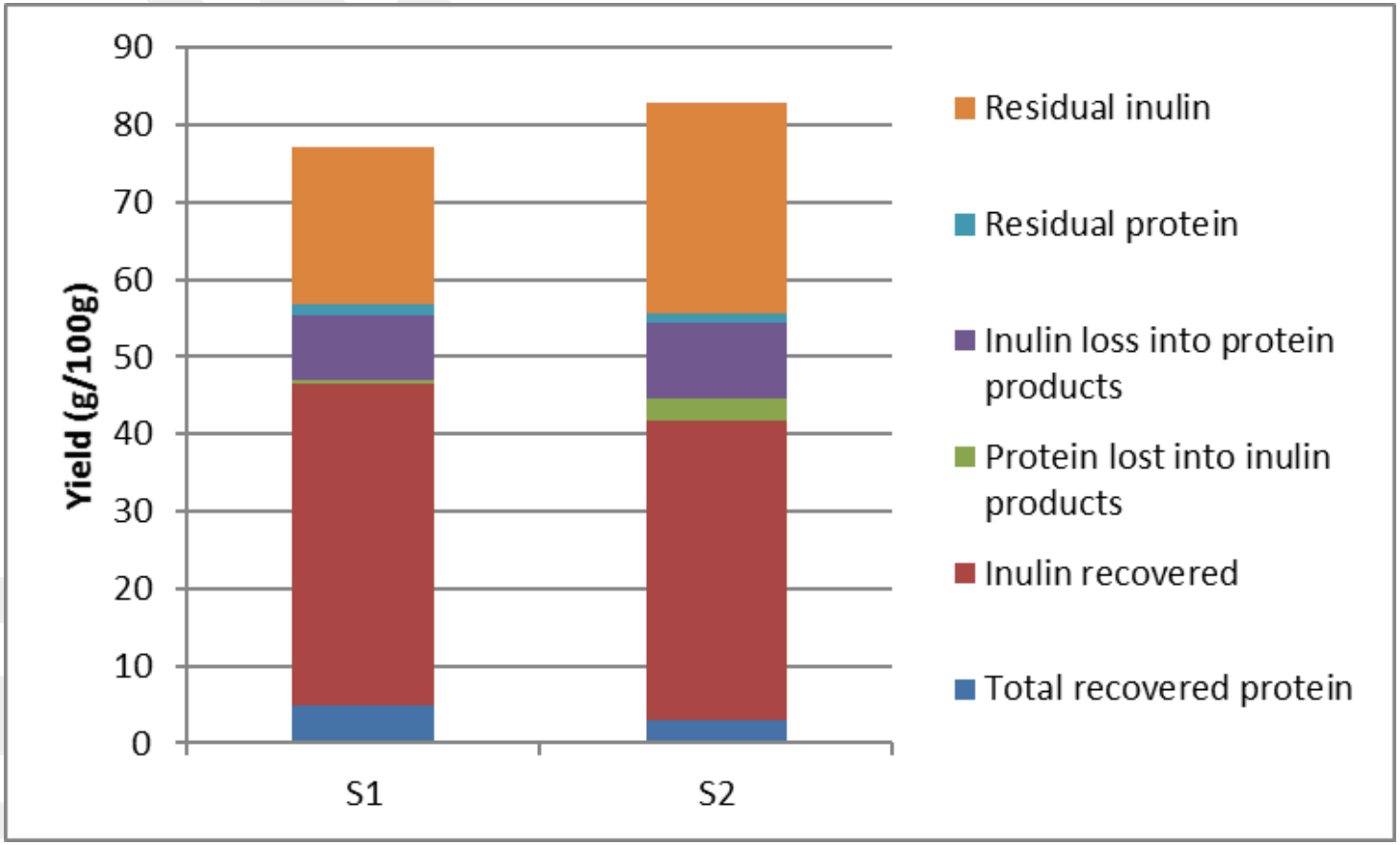


CURRENT FINDINGS

Summary of economically viable components of JA tubers



CURRENT FINDINGS



CONCLUDING REMARKS

- Inulin and protein are the potential high-value co-products
- Protein extraction first maximises performance

Future work:

- Upgrading residues for bioethanol production

ACKNOWLEDGEMENTS

- CRSES
- NRF