

Jerusalem Artichoke Biorefinery for the Production of Bioethanol and High Value Food Products

Maumela P., Görgens J. F., van Rensburg E., Chimphango A.

JA: Potential Feedstock

- Native from North America
- Excellent agronomic traits
- Minimal cultivation inputs
- Easy adaptation to a range of geo-climatic environment



JA Tuber

- Potential feedstock for co-production
- High tuber yields per ha
- Diverse content of inulin and protein
- Potential to improve the economics
- Improve the social and environmental sustainability



Inulin

- Polyfructan
- D-fructose
- Functional properties
- Nutraceutical
- Uses as a sweetener or functional ingredient



Inulin Bioprocesses

- Bioethanol production
- Controversy surrounding biofuels?
- Multi-product approach
- Bioethanol and high value for products
- Minimize waste production



Aim

- **Study the technical feasibility of JA biorefinery and create a database**
- Product streams:
- Bioethanol
- Inulin based nutritional products (FOS, HP-inulin)
- Functional proteins
- Animal feed (DDGS)



Objective 1: Chemical Analysis

Major products

- Protein
- Inulin

Potential impurities

- Fatty acids
- Ash
- Reducing sugars

Objective 2: Extraction

Inulin extraction

- Water diffusion

Performance

- Yield
- Degree of polymerisation

Objective 1: Extraction

Protein extraction

- Alkaline extraction
- Isoelectric precipitation

Performance indicators

- Yield
- Purity
- Technological properties



Objective 2: FOS production

Methods of inulin hydrolysis

- Enzymatic hydrolysis
- Ultrasound sonication

Performance indicators

- Yield
- Purity

Objective 3: Bioethanol Production

Sources of fermentation sugars

- Reducing sugars from FOS purification
- Extraction residue

Enzymatic hydrolysis to obtain fermentable sugars

Conclusions

- Develop lab-scale processes for the co-production of bioethanol and value added food products and animal feed
- Create a database to demonstrate the economic feasibility of the biorefinery
- Demonstrate that the biorefinery is sustainable from an environmental and social perspective

Thank you