Sugar beet leaves – a new source of protein?

Danish Bioeconomy Conference

04.10.2023

Our retail brands

Strong brand in Central and Eastern Europe

More information:

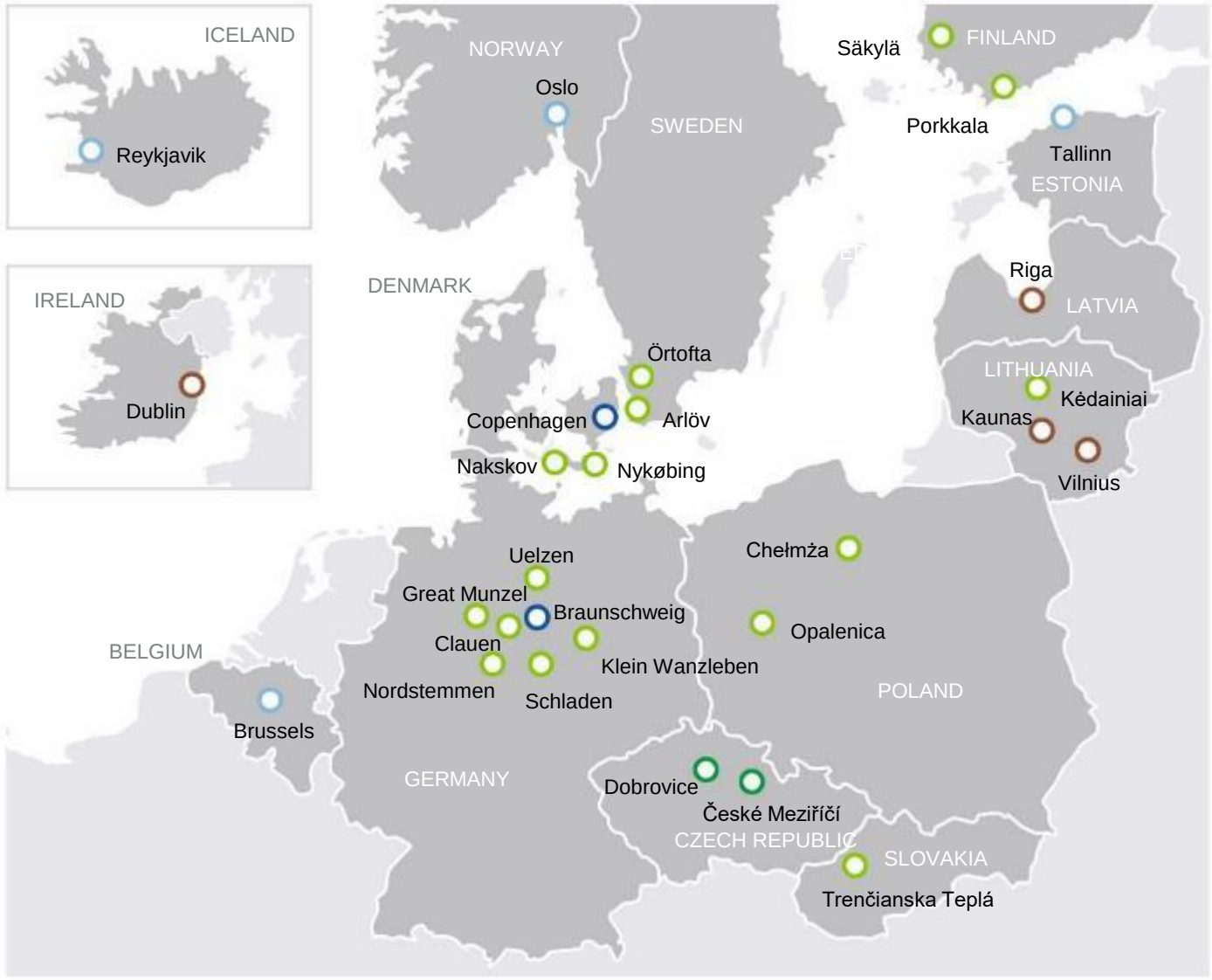
www.sweet-family.de

Market leader in Northern Europe

More information:

www.dansukker.com

Nordzucker in Europe and Australia



- Administration
- Plants
- Non-consolidated Minority interests
- Other locations
- Representative offices

New Opportunities at Nordzucker

- Alternatives from sugar and beet to become an important pillar of our Core Business

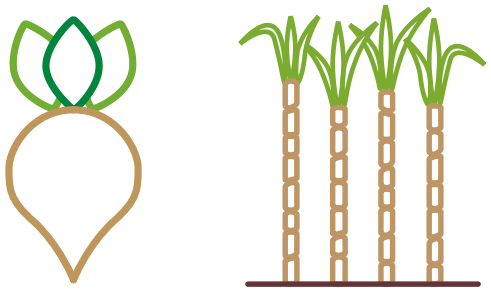
Beet leaves

Beet pulp

Cane bagasse

New Opportunities

Alternative uses of sugar, beet and cane



Sugar

Thick juice

Molasses

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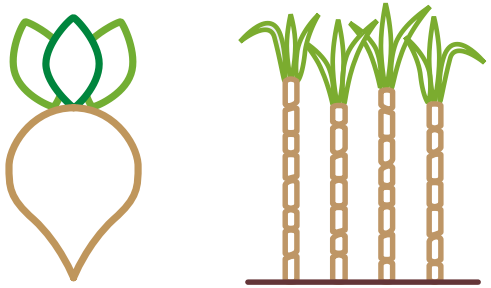


Sugar

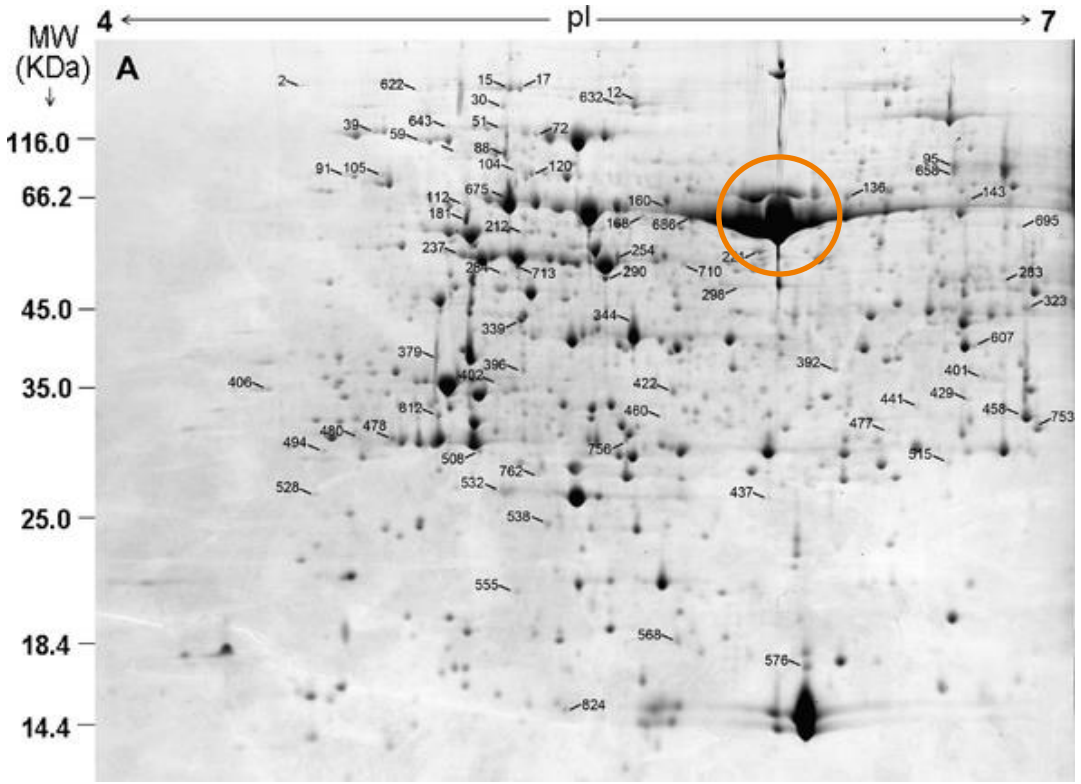
Thick juice

Molasses

Why use sugar beet leaves?

- Beet leaves are rich in protein, fibres and interesting molecules like saponins
- Sugar beet can yield ~40 – 45 t/ha of leaves, currently ploughed after harvest
- Theoretically 250 – 700 kg of leaf protein can be extracted per ha
- Further reduction GHG footprint for sugar beet production

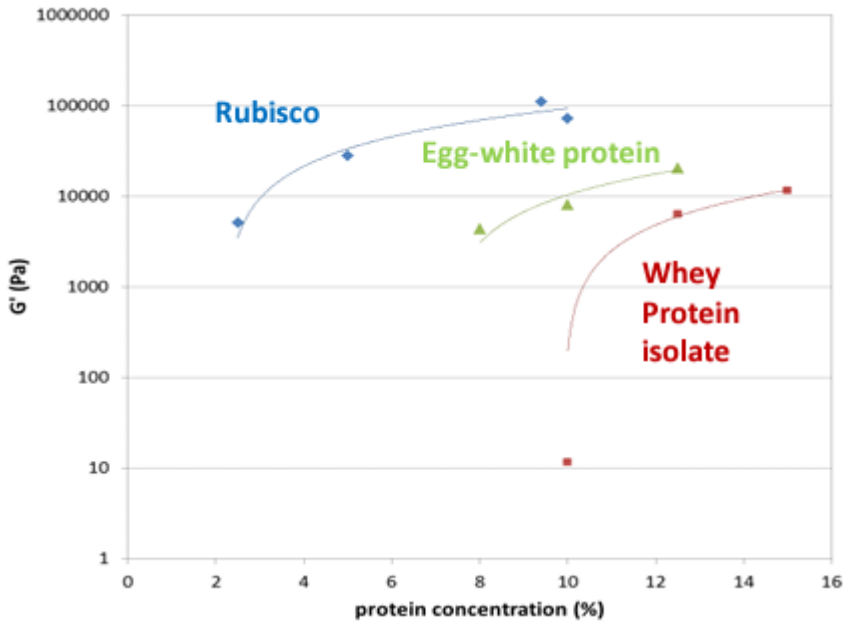
Rubisco



Modified from Pang et al. Journal of Proteome Research 2010, 9, 2584–2599

- Rubisco (Ribulose-1,5-bisphosphat-carboxylase/-oxygenase)
- Catalyzes the fixation of carbon dioxide from the air
- By mass the most abundant protein on earth

Rubisco



Peter Geerdink Protein nutrition for humans and animals, global protein supply and requirements; Presentation given Protein for Life Wageningen University

- Rubisco (Ribulose-1,5-bisphosphat-carboxylase/-oxygenase)
- Catalyzes the fixation of carbon dioxide from the air
- Very good amino acid profile, with excellent digestibility. Comparable with animal proteins like whey and egg
- No known allergies exist as of today
- Functionalities
  - Solubility at low pH > 80% (soy around 40%)[1]
  - Foams are more stable than soy[1]
  - Emulsifying properties similar to whey protein[1]
  - Lower dosage needed for self-supporting gels than for whey or soy protein[1]

1) Martin et.al 2018 Journal of the Science of Food and Agriculturehttps://doi.org/10.1002/jsfa.9335

Harvesting and processing

Harvesting & Logistics

Pressing

Clarification & several processing steps

Final product

- Small scale harvesting with about 3 t of leaves harvested
- Minimal Damage to beets
- Minor sugar losses depending on the time of harvesting
- Final product contained >70% protein (isolate quality)

Functionalities testing

Emulgation of 1 % solutions (50 % rape seed oil)

Foaming of 1 % + NaCl

- Functionality results according to expectations
- Color is to be optimized!

Thank you very much

TEKNOLOGISK INSTITUT

UNIVERSITY OF COPENHAGEN

Lihme Protein Solutions

Thank you for your attention!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THE Sugar Company
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04.10.2023