

# "Functional proteins from vegetable and arable crop residues"

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GreenProtein - Cosun

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#### Plant proteins are the new trend

Expected growth of > 5% per year

- Soybeans are still the most dominant plant protein source
- Others only 1% (2% in 2016)
  - More sources have potential
    - Not only legumes (like pea, lentils, etc.)





Source: Frost & Sullivan analysis, base year 2011

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Protein yield per ha for soy beans and sugar beet leaves are similar

• Green leaf materials have potential as protein source



Source: A. Tamayo Tenorio, "Sugar Beet Leaves For Functional Ingredients," 2017.



There are many green leaves wasted in the food industry

- On the field
- During processing



# Think integrated



Integrated focus during harvesting and fractionation => building new value chains



# **Functional protein from leaves**



Rubisco is a key enzymatic protein in photosynthesis and is found in the chloroplasts



- Rubisco is a very attractive protein for human consumption
  - Good nutritional value
  - Good functionality
  - Good digestibility
  - Non allergenic





LPI is not just a protein, it's a **functional protein** 







Horizon 2020 European Union Funding for Research & Innovation







# Revalorisation of vegetable processing industry remnants into high-value functional proteins and other food ingredients

GA-720728

# **EU BBI GreenProtein project**

- Period: September 2016 till February 20
- Total budget 5,5 million Euro
- EU contribution 4,3 million Euro
- 7 partners 4 countries
- Industry and R&D partners
- Goals:
  - Realise a DemoPlant = TRL 7
  - Develop full scale process conditions
  - Make commercial viable product for market introductions and testing
  - Demonstration of a complete new value chain leading to higher added value products for new markets.

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# **Technology background**

TNO patent application WO2014/104880A1

# Signeen Protein















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Is high purity needed to obtain the desired functionality?



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#### **Primary processing**

High input to obtain highly pure ingredients

- Chemicals
- Water
- Waste

#### Secondary processing

Is this high purity needed to obtain the desired functionality?

- Food products are mixtures
- Many traditional ingredients (e.g. milk, flour) do not have a high molecular purity



#### Lower purity can be positive

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#### Functional pea starch fraction



Source: Marlies E.J. Geerts et al.; Journal of Cereal Science 75 (2017) 116 - 123.

# **Focus on purity**

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#### General relation for plant protein

- High purity
  - Low Yield
    - High Waste





Source: J.A.M. Berghout et al. / Journal of Food Engineering 150 (2015) 117–124

# Conclusions

### Green Leaves are a potential protein source

- Plant based protein
- Reduction of waste
- Add value to farmers and food processing
- Challenges by new raw materials
  - Understanding what is quality
  - Registration (Novel food)
  - Harvesting and collection
  - Building the market and the supply chain
- New business chains are needed







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