Resource efficiency optimisation of second class vegetables via biorefinery solutions to improve sustainability in the agrifood chain and climate change resilience : the European project “DEMETER”

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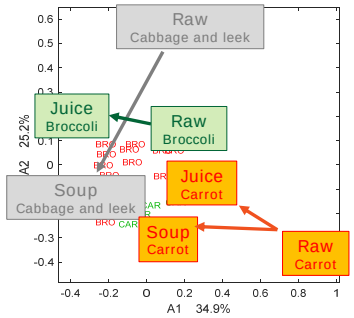
The overall objective of the European FACCE SURPLUS DEMETER project is to establish a more resilient vegetable supply chain by creating a secure and long-lasting sustainable relationship between the vegetable grower (agriculture, no green housing) and its customers in the first step of the agrifood chain. The specific objective of the project is to increase resource efficiency through valorisation of currently not valorised side streams via production of soups, juices and functional ingredients. The expected impacts of the DEMETER project are by valorisation of residues, second and third class vegetables, damaged vegetables, off cuts and peelings to reduce land, water, pesticides and fertilizers consumption and also food contamination.

Vegetable side streams @Verduyn

- Current valorisation feed and petfood

Vegetable	Tons side streams/year
Carrot	14 600
Broccoli	440
Leek	320
Cabbage	2 700

Biochemical changes during processing in juice and soup

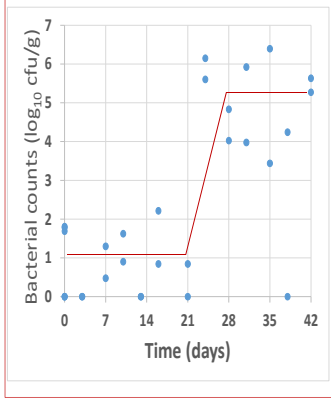


Large variability between vegetables

Carrot, interesting matrix because of its high level in polyphenols and carotenoids and broccoli for its high level in fibre.

During processing: : Broccoli and carrot: decrease of polyphenols, carotenoids and fibres in juice → present in pomaces → **good source for valorization**

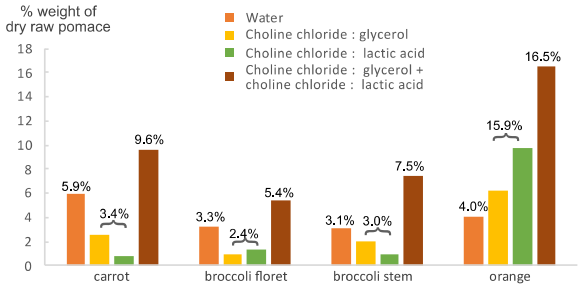
Shelf-life of pasteurized soups at 7°C



Example celeriac soup
No change in bacterial counts for three weeks
Then rapid increase to counts > 10^4 CFU/g.
Potentially a three weeks shelf-life of soups (stored under refrigeration) made with vegetable by-products

Valorisation of pomaces

Yield of water-extracted pectin following pretreatments



Pretreatment of pomaces by novel food-safe (choline chloride-based) eutectic solvents increases pectin yields compared to water

Environmental assessment

What are the environmental benefits of making a soup with by-products?

1 **Scenario A** (reference) 1L of soup based on **by-products** **Compared to** **Scenario B** 1L of soup based on **fresh vegetables**

What are the environmental benefits of processing by-products?

2 **Scenario C** (reference) 1kg of by-products stream **processed into soup** **Compared to** **Scenario D** 1kg of by-products stream for **animal feed**

Live cycling assessment gives better results with by-products

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