DEMETER

RESOURCE EFFICIENCY OPTIMIZATION OF 2ND CLASS VEGETABLES VIA BIOREFINERY SOLUTIONS TO IMPROVE SUSTAINABILITY IN THE AGRIFOOD CHAIN AND CLIMATE CHANGE RESILIENCE

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FACCE SURPLUS
SUSTAINABLE AND RESILIENT AGRICULTURE FOR FOOD AND NON-FOOD SYSTEMS

BACKGROUND

The DEMETER project studies new pathways to increase resource efficiency in the agri-food value chain for the valorisation of vegetable residues that are currently not valorised and are seen as a net loss for the vegetable growers and first transformation industries. these pathways are the production of high-quality juices, cold and hot soup production and cracking of pomace and processing residues into functional ingredients for human consumption.

OBJECTIVE

The overall objective of the project is to establish a more sustainable and resilient agri-food value chain. Thanks to the differentiation in valorization pathways and higher added value products produced out of residues, farmers will generate a higher price for their production and reduce the losses in terms of raw materials and money. Food processors will be able to guarantee more stable prices for the entire harvests to the farmers. This will strengthen the long-term relationship between the vegetable grower and the food processing companies.

METHODOLOGY

The project identifies the most suitable valorization pathways, technologies and process parameters for direct processing of the side streams at the primary processing plants. DEMETER will include economic feasibility and environmental assessment.

RESULTS

The main vegetables for by-product valorization at Verduyn are carrot, broccoli, leek and cabbage. Results show that the by-products of carrot and broccoli are particularly interesting as rich source of fibre, polyphenols and carotenoids.

To improve pectin solubility in food, to modify texture and increase the availability of soluble dietary fibres, ingredients based on carrot and broccoli florets pomaces were produced by pre-treatment with natural deep eutectic solvents (NADES). Results show that phenolics were removed from the pomace by the NADES pre-treatment, but were not recovered in the NADES extract, indicating modification during the process or removal by water washes.

Enzymatic treatment of orange and apple pomace was applied as an aid to improve juice recovery. The most efficient enzymes improved 23% juice recovery for apple and about 15% for orange. Juices and soups were produced from the by-products of carrot, broccoli, cabbage and leek. They were analyzed on rheology, colour, dry matter, soluble solids, titratable acidity, sugars, organic acids, fibre content, polyphenols and carotenoids to evaluate the effect of processing on their organoleptic and nutritional properties. These properties of the juices and soups were similar to those of their corresponding raw materials. The effect of dilution was observed on soups due to the water addition during the processing. For the juices, there was a large reduction of quality due to retention of most micro- and macroconstituents in the pomaces, indicating the importance of the valorization of the pomaces.

A detailed environmental assessment will be performed to compare soup from vegetable by-products with soup from fresh vegetables in order to highlight the potential environmental benefits of a soup based on by-products.