HORTIVALOR - Valorisation of organic garden products through the use of emerging technologies for the treatment of vegetable juices and creams

Summary

The main objective of this pilot project is to develop innovative, safe and highly functional organic fruit and vegetable juices and creams.

For the development of these innovative products, high hydrostatic pressure technology has been applied as a non-thermal method that allows the disinfection and preservation of juices and creams, while maintaining the sensory properties and bioactive compounds of the untreated product. The juices and creams developed have added value thanks to their sensory properties and their content of bioaccessible bioactive compounds.

The development of these products helps to boost the competitiveness of companies in the Catalan fruit and vegetable sector, providing the tools to make the most of surplus primary production from organic farming, and also establishes the basis for making the most of a co-product of the cheese industry such as whey. This action helps to reduce the ecological footprint of fruit and vegetable production, thus contributing to the sustainability of the organic production system.

Objectives

The main objective of the project is the development of innovative, safe and highly functional organic fruit and vegetable juices and creams. To this end, raw materials with optimal properties were identified for the case studies, production control and improvement actions are proposed, a high hydrostatic pressure treatment is validated, innovative fruit, vegetable juices and creams and whey are developed, and these are characterised by their safety and high value in bioactive compounds. Finally, the results were disseminated to small and medium-sized enterprises and the scientific community.

Description of the actions carried out in the project

The following activities have been carried out in order to achieve this objective:
Activity 1. Product catalogue study and selection of case studies
Activity 2. Identification of critical points in the process and possibilities for improvement
Activity 3. Challenge test for validation of APH treatment
Activity 4. Characterisation of innovative products
- 4.1. Shelf-life study
- 4.2. Sensory characterisation
- 4.3. Characterisation of bioactive compound content
- 4.4. Characterisation of the bio-accessibility of bioactive compounds

Activity 5. Outreach actions

Final results and practical recommendations

Gentle thermal pasteurisation and high hydrostatic pressure treatment enabled the development of microbiologically safe chilled juices and creams, extending shelf life from less than 15 days for fresh produce to at least 42 days for vegetable creams and juices, and around 20 days for whey cream. In addition, they largely preserved their bioactive compound content and bioaccessibility compared to untreated fresh juices and creams. It is necessary to monitor a possible colour change during the shelf life of the high-pressure treated products, as this technology has not been able to inactivate the enzymes responsible for the enzymatic browning. However, high pressures have also preserved the sensory properties of untreated juices and creams, unlike mild thermal pasteurisation, which resulted in a decrease of characteristic attributes of the ingredients used in the formulation and the appearance of sensory properties of cooked products. The addition of whey in creams added nutritional value to products and has had a protective effect on the bioactive compound content. These results provide very useful information for companies in the fruit and vegetable sector for the development of innovative and value-added products, which can have a positive impact on their productivity and sustainability.

Conclusions

- High hydrostatic pressure preservation treatment and gentle thermal pasteurisation have ensured safety and extended shelf life from less than 15 days for fresh produce to at least 42 days for vegetable creams and juices, and around 20 days for whey cream.
- The addition of whey in creams, aside from the added nutritional and functional value, had a protective effect on the degradation of vitamin C, carotenoids and some phenolic compounds.
- High pressure and gentle thermal pasteurisation treatments preserved most of the bioactive compounds in the untreated fresh products without causing substantial changes in their bioaccessibility, except for some specific compounds in the case of thermal pasteurisation.
- The high pressures did not inactivate the enzymes of enzymatic browning, so a possible colour change over the shelf life should be monitored.
- Gentle thermal pasteurisation led to changes in the sensory properties of the fresh product.
- Organic fruit and vegetable surpluses can be valorised in juices and creams using high pressure as a preservation treatment, guaranteeing safety and adequate shelf life, while maintaining the functional value and sensory properties of the fresh product.

Leader of the Operational Group

ORGANISATION: DRISSA PRIVATE FOUNDATION

Coordinator of the Operational Group

ORGANISATION: IRTA - Institute of Agrifood Research and Technology

Other members of the Operational Group (grant recipients)

ORGANISATION: Oriol Molist Bas

ORGANISATION: Formatgeries Montbrú, SA

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: Anna Ecològica, SL
ORGANISATION: Èxit Girona Cluster Association
ORGANISATION: Ecoregió, SL

Geographical area(s) of application

PROVINCE(S)	REGION(S)
Girona, Barcelona, Tarragona and Lleida	

Dissemination of the project (publications, conferences, multimedia, etc.)

- Informative video: https://youtu.be/u0F3BbQcqxw
- PATT online conference on 17 May 2021, where the project was presented: https://transferencia.irta.cat/activitats/jornada-conjunta-go-convocatoria-2019-hortivalor-clascuit-i-xerigot/
- PATT online conference on 27 June 2022, "Identifying tools and opportunities in food processing": https://transferencia.irta.cat/activitats/identificant-eines-i-oportunitats-en-laprofitament-alimentari/
- Article published in the newspaper El Punt Avui on 19 August 2020: http://www.elpuntavui.cat/economia/article/18-economia/1837107-biodrissa-i-l-irta-investiguen-com-allargar-la-vida-util-dels-sucs.html
- Article published in TECA magazine: Food Technology and Science, of the Institut d'Estudis Catalans, on the valorisation of organic horticultural surpluses and presentation of the operational group: http://revistes.iec.cat./index.php/TECA/article/view/149511/147171.
- Interview in the programme "Nos patina el embrague" in 97.7 FM Radio Salt on September 29th from 13:00 to 14:00: http://enspatina.blogspot.com/

Project website

- DRISSA PRIVATE FOUNDATION: https://www.fundaciodrissa.com/ca/sobre-nosaltres/grups-operatius.html#gsc.tab=0
- LA FEIXA D'EN FELIU: http://lafeixadenfeliu.com/nosaltres/col-laboracions/
- MONTBRÚ CHEESE DAIRIES: https://montbru.com/ca/blog/noticies/montbru-forma-part-del-projecte-hortivalor-de-lirta-per-al-desenvolupament-de-sucs-i-cremes-ecologics-amb-xerigot
- IRTA: https://www.irta.cat/ca/projecte/go-hortivalor-valoritzacio-de-productes-de-lhorta-ecologica-mitjancant-la-utilitzacio-de-tecnologies-emergents-pel-tractament-de-sucs-i-cremes-de-verdures/

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €142,722.00
Completion date (month-year): September 2022	DACC funding: €58,327.59
Current status: Completed	EU funding: €44,001.51
	Own funding: €40,392.90

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Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1531/2019, of 28 May, announcing the call for the grant.

Generalitat de Catalunya
Departament d'Acció Climàtica, Alimentació i Agenda Rural

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