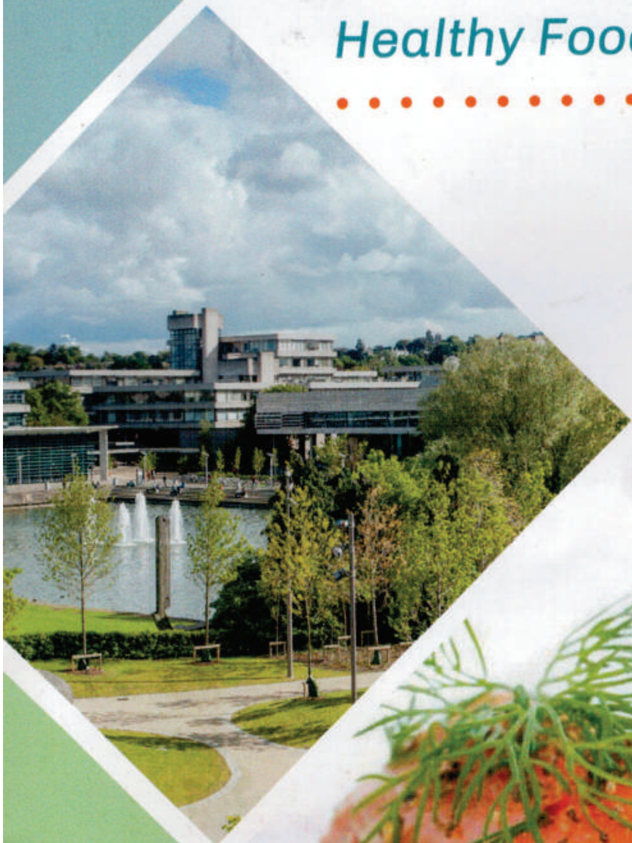
36th EFFoST International Conference

Shaping the Production of Sustainable, Healthy Foods for the Future

7-9 November 2022
Dublin, Ireland



Conference Book

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EFFoST 2022 INTERNATIONAL CONFERENCE
7-9 November
Dublin, Ireland

Organised by: EFFoST

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Co-event: NTP 2022

3.22 **Encapsulating quercetin with amorphous-semicrystalline inulin by spray-drying and releasing under in vitro simulated gastrointestinal conditions**
Alejandra Quintriqueo[1,2]*, Jesús Lozano[2], Estefanía González[3], Begoña Giménez[4], Paz Robert[1], [1]*Universidad de Chile, Chile*, [2], *Spain*, [3]*Universidad de O'Higgins, Chile*, [4]*Universidad de Santiago de Chile, Chile*

3.24 **Delivering nutraceutical flours through valorization of fruit peels using extrusion technology**
Ana Belén Martín-Diana[1], María J. García Casas[1], Jara Pérez-Jiménez[2], María I. Abadías[3], Ingrid Aguiló-Aguayo[3], Daniel Rico[1]*, [1]*Agrarian Technological Institute Of Castilla And Leon (itacyl), Spain*, [2]*Institute of Food Science, Technology and Nutrition (ICTAN-CSIC), Spain*, [3]*IRTA, Parc Científic i Tecnològic Agroalimentari de Lleida, Spain*

3.26 **Effect of heating on textural and temperature sensitivity of casein gels**
Bo Yuan*, Elke Scholten, Guido Sala, *Wageningen University & Research, Netherlands*

4.02 **Pressurized Hot Water Extraction, an Efficient Technique for Extracting Antioxidants from Ghanaian Fruits and Vegetables**
Agnes Aba Abakah[1]*, Johana Rondevaldova[1], Samuel Kwasi Boateng[2], Ebenezer Adu Yeboah[2], Katerina Vihanova[1], Ladislav Kokoska[1], [1]*Czech University of Life Sciences, Czech Republic*, [2]*CSIR-Plant Genetic Resources Research Institute, Ghana*

4.04 **Determination of the potential health benefits of seaweed-derived oligosaccharides and polyphenols: Generation and characterisation strategies**
Dolly Bhati[1]*, Dilip K. Rai[1], Noel McCarthy[2], Maria Hyaes[1], [1]*Teagasc Food Research Centre, Ireland*, [2]*Teagasc Moorepark Food Research Centre, Ireland*

4.06 **Toxicity effects of crude phlorotannins and phloroglucinol in different bioassay models**
Bertoka Fajar Surya Perwira Negara[1,2], Dicky Harwanto[3], Gabriel Tirtawijaya[1], Maria Dyah Nur Meinita[4], Jae-Suk Choi[1,2]*, [1]*Silla University, South Korea*, [2]*Seafood Research Center, South Korea*, [3]*Diponegoro University, Indonesia*, [4]*Jenderal Soedirman University, Indonesia*

4.08 **Let's get Freekeh! The flavor profiles of Freekeh, a toasted, green Durum wheat Mediterranean product**
Alon Cna'ani*, Anna Balsby, Michael Bom Frøst, *University Of Copenhagen, Denmark*

4.10 **GABA-enriched synbiotic fermented milks: physicochemical, biological, structural, and sensory attributes**
Farhad Garavand[1]*, David Daly[1], Laura Mascaraque[1], [1]*Teagasc Moorepark Food Research Centre, Ireland*, [2]*Abbott Nutrition, Ireland*

4.12 **Submerged cultivation of Ganoderma lucidum, Monascus purpureus and in vitro comparative study of their bioactivity**
Chrysanthi Mitsagga, Ioannis Giavasis*, Konstantinos Petrotos[2], Athanasios Jamurtas, *University of Thessaly, Greece*

4.14 **Evaluation of the antirotaviral activity of milk extracellular vesicles using a human intestinal model**
Dimitra Graikini[1,3]*, Caroline Vangsøe[2], Ines Abad[1,3], Lourdes Sánchez[1,3], Jan Trige Rasmussen[2], [1]*University of Zaragoza, Spain*, [2]*Aarhus University, Denmark*, [3]*AgriFood Institute of Aragon (IA[2]), Spain*

4.16 **Antimicrobial activities of polysaccharide-rich extracts from the Irish seaweed Alaria esculenta against foodborne pathogens**
Ailbhe McGurrin[1]*, Julie Maguire[2], Rahel Suchintita Das[1], Brijesh K. Tiwari[3], Marco Garcia Vaquero[1], [1]*University College Dublin, Ireland*, [2]*Bantry Marine Research Station Ltd, Ireland*, [3]*Teagasc Ashtown Food Research Centre, Ireland*

P2.4.18 **Bioactive Fucoxanthin from Edible Marine Algae: An Update on Biofunctional Evidence for Healthy Diet**
Md. Mohibbullah[1,2]*, Jae-Suk Choi[2], [1]*Sher-e-Bangla Agricultural University, Bangladesh*, [2]*Seafood Research Center, Silla University, South Korea,*

P2.4.20 **Comparative metabolite profile and antioxidant potential of germinated wheat (Triticum aestivum L.) beverage during preparation**
Sewon Park[1]*, Bo ram Kim[1], Mi Jeong Kim[1,2], [1]*Interdisciplinary Program in Senior Human Ecology, South Korea*, [2]*Changwon National University, South Korea*

P2.4.22 **ACE inhibitory peptides from sustainable protein sources**
Lizeth Ospina Quiroga, Raúl Pérez Gálvez*, M.Carmen Almécija Rodríguez, Pedro J. García Moreno, F. Javier Espejo Carpio, Antonio Guadix, Emilia M. Guadix, *University Of Granada, Spain*

P2.4.24 **Glucosinolates and potential antioxidant of broccoli (Brassica oleracea) as affected by different vacuum drying temperatures**
Antonio Vega-Galvez*, Elsa Uribe, Alexis Pastén, Luis Gómez-Pérez, Nicol Mejias, Javiera Camus, Michelle Rojas, *Universidad De La Serena, Chile*

P2.5.02 **Development of chocolates with functional ingredients as key drivers for health benefits**
Irina-Elena Chiriac[1]*, Montse Jorba[1], [1]*Leitat Technological Center, Spain*

P2.5.04 **Mechanistic understanding of food protein fibrils: laying the groundwork towards their usage as techno-functional enhancers**
Joelle Housmans[1,2]*, Bert Houben[1,2], Jan A. Delcour[2], Joost Schymkowitz[1,2], Frederic Rousseau[1,2], [1]*VIB-KU Leuven Center for Brain & Disease Research, Belgium*, [2]*KU Leuven, Belgium*

P2.5.06 **Comparison of protein quality of insect powders obtained by thermomechanical or by CO_2 supercritical processes**
Vanessa Jury[1]*, Sophie Laurent[1], Danneyvis Niyeldi Alarcon Gerdel[1], Marie de-Lamballerie[1], Francine Fayolle[1], [1]*Université de Nantes, France*

P2.5.08 **Understanding plant – salivary protein interactions to reduce astringency perception** Hanna Lesme[1]*, Max Jansen [2], Bruno Correia[2], Francesco Stellacci[1], [1]*Institue of Materials, EPFL, Switzerland*, [2]*Institute of Bioengineering, EPFL, Switzerland*

P2.5.10 **Egg white amyloid fibrillation in the presence of sugars and its potencial for protein fucntionality**
Margarita Monge-Morera[1]*, Frederic Rousseau[2], Joost Schymkowitz[2], Paula Moldenaers[3], Jan A. Delcour[1], [1]*KU Leuven, Belgium*, [2]*VIB Switch Laboratory, KU Leuven, Belgium*, [3]*Soft Matter, Rheology and Technology, KU Leuven, Belgium*

P2.5.12 **Evaluation of quinoa leaves as a protein source**
Sara Pérez-Vila[1,4]*, Francisca Acevedo[2,3], André Brodkorb[1], Monica Rubilar[3,5], Eduardo Morales[3,5], Sofia González[3,5], Mark A. Fenelon[3,5], James A. O'Mahony[1,4], Laura G. Gómez-Mascaraque[1], [1]*Teagasc Food Research Centre, Moorepark, Ireland*, [2]*Universidad de La Frontera, Chile*, [3]*Universidad de La Frontera, Chile*, [4]*University College Cork, Ireland*, [5]*Universidad de La Frontera, Chile,*

P2.5.14 **Thiamin, riboflavin, and folate retention in faba bean and lupine extrudates**
Aino Siitonen*, Minnamari Edelmann, Veronika Kallio, Katja Kantanen, Jose Martin Ramos Diaz, Kirsi Jouppila, Susanna Kariluoto, Vieno Piironen, [1]*University of Helsinki, Finland*

P2.5.16 **Heat Gelation of Commercial Pea Protein Isolates**
Alice Tiong*, Warren Batchelor, Leonie van't Hag, *Monash University, Australia*

DELIVERING NUTRACEUTICAL FLOURS THROUGH VALORIZATION OF FRUIT PEELS USING EXTRUSION TECHNOLOGY

Martin-Diana, A.B.[1], García Casas, M.J.[1], Pérez-Jiménez J.[2], Abadias, M.I.[3], Aguiló-Aguayo, I.[3] and Rico, D.[1]*

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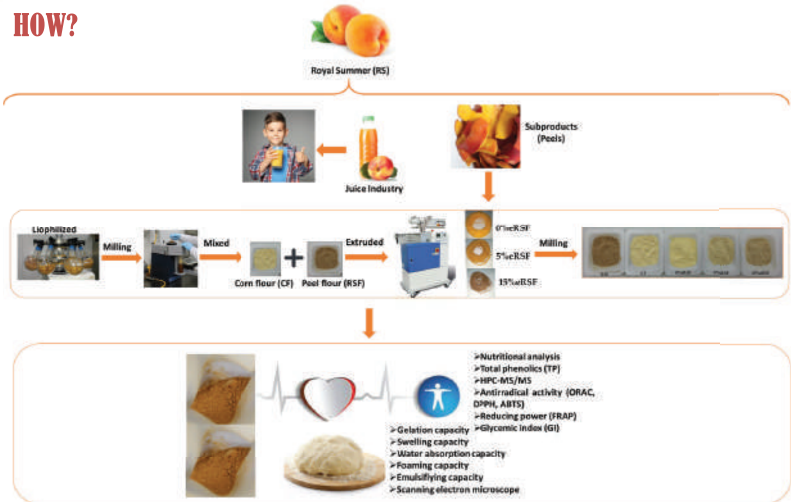
WHY?

- **NEW STRATEGIES** based on fruit by-product valorisation are helpful in decreasing the volume of food waste and offer opportunities for novel processes and products, increasing the economic value of food processing chain.
- **BY-PRODUCTS** represent an interesting source of bioactive compounds, such as polyphenols and dietary fibre, with high antioxidant activity.
- **NON-GLUTEN FLOURS** are characterised by poor fibre and natural antioxidant content. The addition of valorised by-products can enhance nutritional and healthy profiles of gluten-free flours.
- **EXTRUSION** technology offers advantages for efficient, sustainable and versatile processes to develop novel gluten-free flours.

WHAT?

The objective of this work was to valorise fruit peels obtained from juice processing for developing nutraceutical gluten free flours.

HOW?



FINDINGS

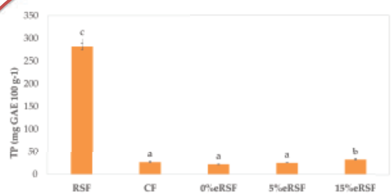


Figure 1. Total phenol (TP, mg GAE 100 g-1 of flour) of native and extruded flours. Abbreviations: RSF: Royal Summer flour; CF: corn flour; 0%eRSF: 0% extruded Royal Summer flour; 5%eRSF: 5% extruded Royal Summer flour; 15%eRSF: 15% extruded Royal Summer flour. Different lowercase letters indicate significant differences for mean values (one-way ANOVA, Duncan´s test, p ≤ 0.05) between samples.

Table 1. Proximal composition (g 100 g-1 of flour) of native and extruded flours. Abbreviations: RSF: Royal Summer flour; CF: corn flour; 0%eRSF: 0% extruded Royal Summer flour; 5%eRSF: 5% extruded Royal Summer flour; 15%eRSF: 15% extruded Royal Summer flour. Different lowercase letters in the same column indicate significant differences for mean values (one-way ANOVA, Duncan´s test, p ≤ 0.05) between samples. Ash, fat, moisture, protein, carbohydrates, fibre and starch are expressed as g 100 g-1 of sample .

Flour	Ash	Fat	Moisture	Protein	Carbohydrates	Fibre	Starch
RSF	3.70±0.06	0.47±0.04	5.44±0.03	6.88±0.04	83.51±1.22	22.50±0.11	4.58±0.07
CF	0.41±0.06	0.80±0.04	13.22±0.03	6.56±0.06	79.01±1.22	4.30±0.11	69.55±1.25
0%eRSF	0.43±0.06	1.71±0.04	9.01±0.03	6.81±0.04	82.04±1.22	2.10±0.11	77.76±3.00
5%eRSF	0.62±0.06	0.77±0.04	8.79±0.03	6.81±0.04	83.02±1.22	2.50±0.11	63.42±1.78
15%eRSF	0.98±0.06	0.87±0.06	9.17±0.03	6.88±0.04	82.00±1.22	5.90±0.11	67.40±0.64

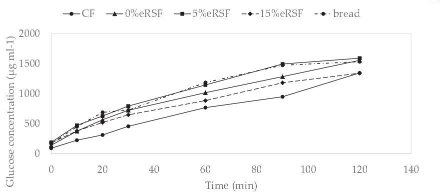


Figure 3. Glucose kinetics consumption (µg mL-1) of nativa and extruded flours. Abbreviations: CF: corn flour; 0%eRSF: 0% extruded Royal Summer flour; 5%eRSF: 5% extruded Royal Summer flour; 15%eRSF: 15% extruded Royal Summer flour.

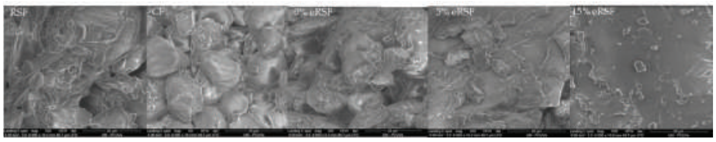


Image 1. SEM micrographs from raw material used for extrusion (Royal Summer flour (RSF) and corn flour (CF)) and extruded flours (0% extruded Royal Summer flour (0%eRSF), 5% extruded Royal Summer flour (5%eRSF) and 15% extruded Royal Summer flour (15%eRSF)) of the surface.

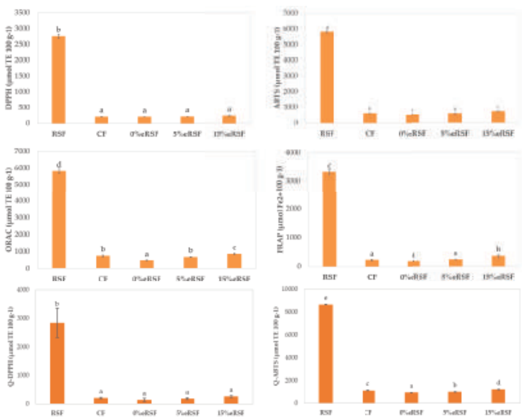


Figure 2. Total antioxidant activity as DPPH, ABTS ,+·ORAC (µmol Trolox equivalents (TE) per 100 g of flour), FRAP (mmol Fe2+ 100 g-1 of flour) and direct antioxidant properties Q-DPPH and Q-ABTSµ) +·mol Trolox equivalents (TE) per 100 g of flour) of native and extruded flours. Abbreviations: RSF: Royal Summer flour; CF: corn flour; 0%eRSF: 0% extruded Royal Summer flour; 5%eRSF: 5% extruded Royal Summer flour; 15%eRSF: 15% extruded Royal Summer flour. Different lowercase letters indicate significant differences for mean values (one-way ANOVA, Duncan´s test, p ≤ 0.05) between samples.

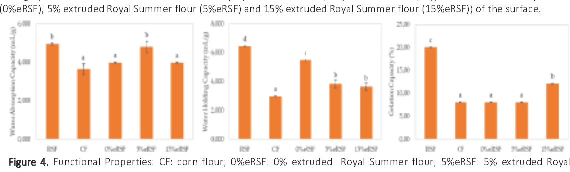


Figure 4. Functional Properties: CF: corn flour; 0%eRSF: 0% extruded Royal Summer flour; 5%eRSF: 5% extruded Royal Summer flour; 15%eRSF: 15% extruded Royal Summer flour.

- Total phenol content of RSF was ten times that of RC (282.47±7.28 vs. 26.93±0.87 mg GAE 100 g^{-1}) **(Figure 1)**. After extrusion, increases in TP of 13 and 45% were observed.
- Similarly, antioxidant capacity of RSF was 7 to 15 times that of corn, depending on the method used. Increases in ORAC values of 45 and 83%, and of 36 and 100% in FRAP, were observed in 5 and 15% RSF samples, respectively **(Figure 2)**.
- The formulation with 15% RSF resulted in a 3-fold increase in dietary fibre in extruded corn flour **(Table 1)**.
- The incorporation of RSF in the mixtures favoured the reduction of the glycemic index (GI) **(Figure 3)**.
- RSF also increased water absorption and water holding capacities, of special interest for bakery products and wheat flour substitution **(Image 1, Figure 4)**.
- Interestingly, 15% RSF resulted in the highest gelation capacity, as compared to the rest of extruded samples, suggesting that the increased dietary fibre may be related to an increase in the soluble fibre fraction **(Table 1, Figure 4)**.

CONCLUSIONS

The formulation with Royal Summer peach-formulated corn flours (RSF) enhanced in antioxidant capacity and techno-functional properties, may result in innovative and sensorially differentiated beverages and food. Improved techno-functional characteristics, such as water holding and gelation capacities, can be of help in improving properties such as adhesiveness in plant-based meat-like formulations, for instance, contributing to their fibre and bioactive content.

Acknowledgements

Spanish Ministry of Science and Innovation (MCINN) for granting ALLFRUIT4ALL project (PID2019-104269RR-C32)

Certificate of Attendance

We hereby confirm that

Dr Daniel Rico

attended

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7-9 November 2022, Dublin, Ireland

Prof. Dolores O'Riordan
For and on behalf of EFFoST

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