

A New Look at Carrot Waste

CyberColloids research project update

CyberColloids has just completed a second EPA Green Enterprise funded project which focussed on the upgrade of Irish vegetable processing and supply chain waste into new food ingredients. The specific focus was on the production of functionalised fibres from out-graded & “wonky” carrots and carrot peelings.



Carrot fibres have excellent water binding and gelling properties on account of the cellulose and pectin that are naturally present. Fibres with water binding and gelling capacity can be used to provide textural functionality in food and thus, are important tools for food formulators. We reported earlier in the project that carrot fibres produced at CyberColloids using Irish raw materials had comparable water binding capacity to commercially available carrot fibres and much higher water binding capacity than fibres derived from other vegetables.

With subsequent research we have been able to improve on this and can now produce carrot fibres that can bind in the region of 15 to 18 times their weight in water. Our new fibres therefore, have comparable water binding functionality to the citrus derived fibres that are considered as market leaders (Fig. 1).

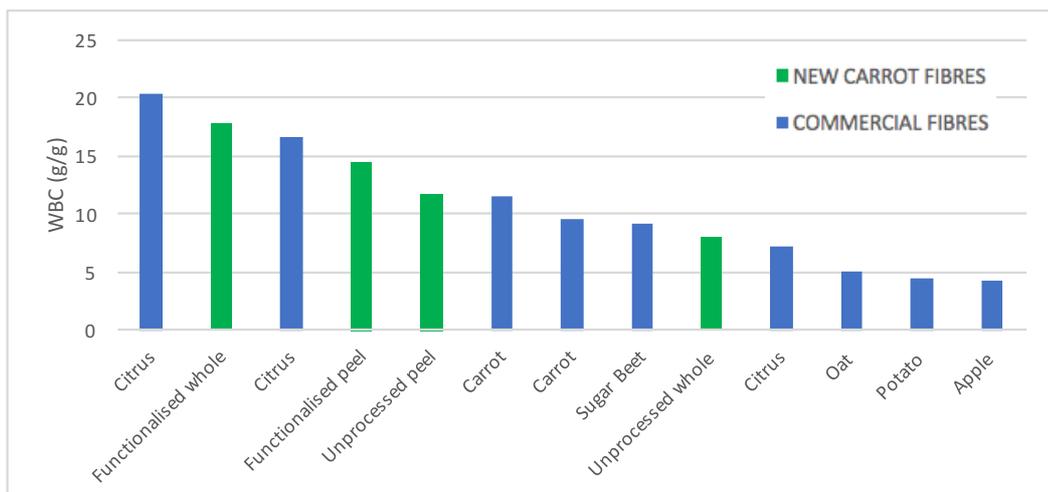


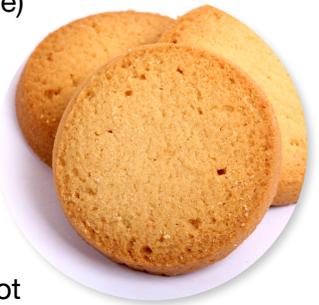
Figure 1. Water binding capacity (g/g) of our new carrot fibres versus commercial fibres

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What we specifically wanted to demonstrate in this project was how these new fibres could be used to add textural functionality in different food products. We chose a range of commercially relevant applications in which water binding and/or gelling was important e.g. maintaining juicy texture and freshness in processed meat and bakery products or replacing ingredients such as fat in healthy foods.

COOKIES: carrot fibres can be successfully incorporated into healthy (added fibre) cookies. The primary aim was to produce cookies that had a crisp texture but that were not too dry or dense - as can often be the case with higher fibre products. Carrot fibres were added at 3% and 6%. Although the aim was to produce a crisp cookie we found that different textures - from crisp to chewy - could be achieved using the different carrot fibres. In all cases, the doughs had good handleability and the size and shape of the cookies was very consistent on baking.



VEGETARIAN BURGERS: the gelling functionality of the new carrot fibres was specifically targeted in this application. The aim was to develop an egg-free burger with a good texture. Egg protein is commonly used as a binder in vegetarian products but we wanted to develop a burger that was also suitable for vegans. The gelling capacity of fibres from either whole carrots or peel was high and both performed very well in this burger application. We believe that there is plenty of scope to develop different healthy burger formulations with good texture, including gluten-free options, using carrot fibres and even blends of the different carrot fibres.



BEEF BURGERS: carrot fibres can be used in low fat beef burgers (7.5%) to provide a juicy texture and to control the loss of moisture during storage and cooking. We have tested the fibres in both fresh and frozen burgers where different water binding properties are needed. Successful use of the new carrot fibres is not only important for improving the sensory quality of burgers that have a reduced fat content but also on the cost of production, storage and packaging.



CANNED MEAT PRODUCTS: one of the most exciting findings of this research was the discovery that the functionalised carrot fibres could be used to form heat stable gels, even under severe processing conditions like canning. There is significant commercial scope for new clean label texture ingredients that can be used to replace the food additives (E Nos) that are mostly used at present.

CyberColloids - specialists in healthy food texture

In the past, the production of food ingredients has led to the purposeful extraction, removal, substitution and throwing away of substantial amounts of biomass that often includes key nutritional or functional components. Whilst a few years ago, the sub-products generated during processing constituted an economic and environmental problem, today they are considered promising sources of functional compounds with commercial value. CyberColloids recognise this potential and have a particular interest in the upgrade of under-utilised fruit and vegetable waste materials into new texture ingredients for innovative and healthy food applications.



Contact us - for more information about this project, our other research and how we could work with you, please visit our website www.cybercolloids.net or contact Dr Mariel Brooks: mariel@cybercolloids.net
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