

Project Summary

‘Greenleaves – Wet extraction of leaf protein from fresh sprouted broccoli and other green leafy vegetable waste’ Project

KEY POINTS

1. The opportunity to utilise up to 100% of some types of fresh green leaf food waste from supermarkets was demonstrated.
2. Value-added or upcycled product outputs were protein isolates and fibre-rich fractions as either dry or wet food ingredients.
3. Fibre-rich green leaf fractions could be successfully incorporated into a wide range of food products without detrimental changes on the texture, shape, mouthfeel of the food. Sensory feedback was generally favourable.



Figure 1. Meatballs and beefburger patties made with finely sliced sprouted broccoli stem replacing up to 40% of the regular amount of meat.

THE CHALLENGE

To reduce the biomass of particular green leaf food waste going to compost or animal feed from a specific food producer/processor and a typical retail supermarket in order to understand if up to 100% of it could be upcycled into food for people.

THE OPPORTUNITY

Upcycled food ingredients can be made from certain green leaf biomass when collected and processed in conditions that maintain freshness. Up to 100% of some of the green leaf biomass could be upcycled. The ingredients produced through this process found a wide range of food applications that were well accepted. The logistical and practical barriers to a commercially-viable scaleup of this approach in a metropolitan area are substantial. The nutritional composition of the fibre-rich ingredients make it difficult to promote them to consumers who are used to marketing messages about ‘superfoods’. The global mega-trend of prebiotic foods for intestinal health through improving the gut microbiota offers the potential to create more interest for such fibre-rich ingredients that do not come with an “E” number (clean label). Protein isolates will find commercial uptake but the yield of these is but a few percent of the actual biomass, so without a use for the fibre-rich fraction much of this resource could still go to compost or animal feed.



Figure 2. Dried fibre-rich fractions from lettuce, cauliflower, red and green cabbage.

OUR RESEARCH

This Project shows that it is feasible to upcycle close to 100% of these types of green leaf biomass and transform them into value-added food ingredients. Given the substantial investment costs of doing so however, customers for both the protein isolate and the fibre-rich fraction are needed lest this green leaf biomass continue to go to low-value destinations like landfill or compost.

OUTCOMES

This Project showcased the potential to upcycle certain green leaf and stem food waste from cabbage, cauliflower, sprouted broccoli and lettuce to create product outcomes. The Project successfully demonstrated that the fibre-rich fractions could relatively easily be included as ingredients into a wide range of food products without detrimental impacting on the appearance, volume, texture and shape of the food product, and with sensory outcomes that were widely assessed as positive. The Project also demonstrated the potential for effective through value-chain collaboration from a food grower, a food processor, a food retailer and a plant protein innovation start-up company to help increase the amount of green leaf material that could enter the food system as value-added ingredients.

IMPACT

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NEXT STEPS

The opportunity to use the least processed, fibre-rich fraction being wet sprouted broccoli stem as a chilled and/or frozen format in a business-to-business food manufacturing scenario is possible. By keeping the material wet it avoids the expense of drying, and by capturing it closer to the farm the logistics of supply and transport are minimised. The nutritional benefits of broccoli are well recognised and by chopping it finely and incorporating it into a complex food product such as meatballs or beefburgers, it may help to increase vegetable intake by consumers wary of eating them in a more obvious serving format. The growing awareness of the importance of prebiotic foods to improve the gut microbiome fits well with the potential for these ingredients.

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PROJECT WEBPAGE

<https://endfoodwaste.com.au/projects/greenleaves-wet-extraction-of-leaf-protein-from-fresh-broccolini-and-other-green-leafy-vegetable-waste/>

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