
# POSTER ABSTRACTS

## Processing of edible insects to produce novel foaming agents

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As world population increases the pressure exerted by food supply chains on the environment rises. Several global food authorities, including the FAO, have endorsed entomophagy, the consumption of insects, as a solution to this problem. Comprising 35-61% protein, insect species are richer in protein than many pulses and their high fecundity, poikilothermic nature, higher feed-conversion rate, and lower land requirement reduces the environmental impact of insect production. One obstacle to large-scale adoption of entomophagy, particularly in developed countries, is a degree of disgust and distaste towards eating visible insects. To overcome this, processing insects into powders and protein extracts allows invisible incorporation into food products.

In our contribution, we will build on the utilisation of invisible insects not only for nutritional contributions, but functional properties. One functional property typically associated with protein ingredients is foaming; the ability to stabilise air bubbles in a continuous liquid phase. This is fundamental to the creation of aerated food products such as cakes, mousses, and meringues. We will present our evaluation of two insect species (Tenebrio molitor and Gryllus bimaculatus) as sources of novel foaming agents. Crude insect powders were not capable of producing or stabilising a foam, which we hypothesised was due to the lipid component of the insects (17-27 %). After defatting, both insect powders produced and stabilised foams. Protein fractionation, utilising the Osborne method, was carried out to separate the protein component based on solubility. All protein fractions produced and stablilised foams; the salt-soluble globulin fractions of both species exhibited the greatest foam capacity and stability, significantly greater than the control egg white protein foam and defatted insect powders ($p<0.05$). Other fractions were not significantly different or were significantly poorer foaming agents than the control. Conclusively, our study shows that, with suitable refinement, insect proteins may suitably replace animal-derived foaming agents.

## Incorporated of β-glucans from cereals, mushrooms and yeasts in foods.

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Varied cereal plants including, mushrooms, yeast, bacteria and algae are important sources of β-glucans, and many extraction procedures have been used in order to recover these valuable naturally occurring polysaccharides. The rheological and molecular properties of β-glucans can be utilized to be incorporated into various foods and to offer properties extremely beneficial to human health. Their functional effects are mainly determined by their molecular and structural characteristics. Consumption of foods fortified and enriched with β-glucans can contribute to the treatment of certain chronic diseases. Reduced cholesterol, cardiovascular and diabetic risk and moderate glycaemic response of foods have been recorded with the consumption of these biologically active compounds. In addition, β-glucans are characterized by anti-cancer, antioxidant, anti-inflammatory and antiviral activities. As β-glucans interact with the foods in which they are incorporated, this study aims to discuss recent applications with quality and nutritional results of β-glucans incorporations with foods such as beverages, dairy, bakery, meat, and pasta products, as well as their uses in other fields like medicine.

## Natural wax improves the stability of sunflower oil during deep-fat frying

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Deep-fat frying is a popular food preparations method. Several physical and chemical changes occur on processing deteriorating the oils' quality, including increased viscosity, darkening of the oil and formation of undesirable compounds such as unsaturated trans-fatty acids. To preserve the quality and improve frying oil durability, the use of both synthetic and natural antioxidants has been studied. Recently natural waxes have been added to the frying oil to improve the frying stability. Natural waxes have a diverse chemical composition, including molecules with potential antioxidant properties. This study investigated the benefits of adding a natural wax at a low concentration to reduce sunflower oil (SFO) deterioration during frying.

Potato chips were fried for 5 min in the oil-wax blend at 175°C for up to 280 fry-ups (FU). SFO was used as a control oil. To assess changes in oil quality, colour, viscosity, Peroxide Value, p-Anisidine Value (pAV) and Free Fatty Acids (FFAs) were measured. At the early stages of frying there was no significant difference between SFO and SFO-wax blend. However, at 160 FU the oil-wax blend displayed a significantly lower viscosity (82.82 mPa·s) (n=3) than SFO (91.39 mPa·s) at 20°C. The addition of wax reduced the darkening during frying (C* of 58.8 and 55.7 for SFO and SFO+wax, respectively). The degradation rate of the peroxides in the SFO+wax blend was slower than in SFO. SFO+wax blend pAV was lower than in SFO. Wax addition significantly reduced the release of FFAs. At 280 FU, SFO contained 20% more FFAs than SFO+wax (1.119% vs 0.868% of oleic acid). These findings suggest that the addition of a natural wax at low concentration improves the stability of SFO, which may be attributed to waxes possessing a broad spectrum of antioxidant capacity. SFO-wax blends could be implemented as frying media with long working life.

## Why the HERU deserves an Earthshot Prize!

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The Home Energy Recovery Unit (HERU, www.myheru.com) allows households and businesses to recover energy from materials that would otherwise be discarded as wastes, by pyrolysing these resources into combustible gases that can be burned in hot water boilers, saving money and saving the environment. HERU has been developed over the last eight years to bring pyrolysis into households as the equivalent of other domestic appliances such as washing machines. HERU converts a range of materials (e.g. uneaten food, garden trimmings, plastic packaging, composites, nappies) into pyrolysis gas which is burned in a domestic boiler to provide hot water and space heating.The Earthshot Prize (https://earthshotprize.org), inaugurated in 2021 by Prince William and Sir David Attenborough, aims to incentivise changes to help repair the planet in relation to five areas: Protect and Restore Nature, Clean Our Air, Revive Our Oceans, Build a Waste-Free World and Fix Our Climate.

The selection process prioritises “solutions that are beyond idea stage, with working prototypes or proven effectiveness, ready to be scaled or replicated rapidly. Nominations are assessed in terms of the inspiring stories behind them, their inclusivity, equity and benefits for humans, their impact on the Earthshot goals, and the ability for this impact to be scaled.”HERU meets the Earthshot criteria for the Build a Waste-Free World: it has arisen from a compelling personal story, has demonstration units with >10,000 hours of operation, is ready to be scaled up in both size and scope of deployment, and addresses the challenging issue of dispersed and diverse waste and turning this into valuable resource that can benefit the finances of individual homes and businesses while also reducing their environmental impact. The benefits of the HERU depend on maximising the recovery of energy while keeping purchase costs affordable for households; the award of an Earthshot Prize would support investment in research and production capabilities to help bring the HERU into every home.

## Making sustainable food choices during ‘Veganuary’ may negatively impact micronutrient intake

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Vegan diets have been advocated as a healthy and environmentally sustainable food choice due to being rich plant-foods and low in animal products. Campaigns that promote temporary removal of animal products from the diet such as ‘Veganuary’ are becoming popular and appeal to individuals making sustainable decisions. In 2021, 500,000 people worldwide signed up ‘Veganuary’. Research into the effects of short-term vegan diets on micronutrient intake is limited and we are yet to understand the motivations of those who pledge to abstain from animal products. We evaluated the effect of ‘Veganuary’ on micronutrient intake in UK adults (18-60y) choosing to following a short-term vegan diet (4-week) in the month of January. We additionally addressed the motivations influencing adherence to short-term vegan diets.

Micronutrient intake was estimated before and after short-term vegan diets using three-day food diaries (FD) and food frequency questionnaires (FFQ). Urinary iodine concentration (UIC) was analysed by Inductively coupled plasma mass spectrometry (ICP-MS) and classified by World Health Organisation (WHO) criteria. Motivation to follow a vegan diet was assessed with a 23 item questionnaire. Individuals were grouped according to baseline dietary data and included controls for each dietary group. Genstat (20th Ed) was used for statistical analysis. A total of 83 participants were recruited between November-December 2019. Intake of calcium by FD, and thiamine, vitamin B12 and iodine by FFQ, significantly decreased in omnivores following a short-term vegan diet. Calcium, by FD, increased with time in the vegan control group. Median UICs were below the WHO criteria for sufficiency (>100 µg L−1) for all groups. Sustainability, climate protection and health motives were the biggest drivers for short-term vegan diets. Short-term vegan diets may pose challenges to achieving adequacy for specific micronutrients. Research into improving the nutritional intake of those making sustainable food decisions in the short-term is required.

## The effect of popping, a sustainable form of processing, on antinutritional factors in pulses

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Demand for animal protein is expected to double by 2050. Negative environmental impacts are associated with production and consumption of animal-derived protein, signifying the importance of utilising alternative protein sources to ensure a sustainable future. Pulses are gaining traction as a staple food due to their desirable nutritional profile, accessibility, and sustainability. However, the presence of antinutritional factors (ANFs) in pulses can negatively impact the digestibility and bioavailability of protein and minerals, with food processing a common strategy to reduce the ANF content. Current pulse processing methods (soaking, boiling and roasting) have high cooking and processing times, and use copious water and energy. Popping is a treatment that uses low water, produces no waste, and employs HTST (high-temperature short-time) processing to create fast and ready-to-eat snacks with desirable nutritional and sensory properties.

In this research, chickpea and red kidney bean were subjected to several processes: soaking, roasting, boiling, and popping after which the samples were dried and ground to fit a 425-micron sieve before being analysed for ANFs. Megazyme phytic acid kit and the vanillin-HCl method were used to quantify phytic acid and condensed tannins respectively. Folin-Ciocalteu assay was used to quantify soluble and bound phenolic levels. Popping caused a significant decrease in phytic acid in both pulses. Condensed tannins in red kidney bean significantly reduced after four-second popping but significantly increased after eight-second popping in both pulses. Soluble phenolics significantly increased for nearly all popping parameters (popping time, sample format and equipment), with the one exception significantly reducing soluble phenolics. Bound phenolics significantly decreased after all popping processing. All treatments, except roasting, significantly reduced total phenolic content. Popping should be considered for food processing in developed and undeveloped countries to reduce levels of antinutritional factors and therefore enhance the nutritional properties of pulse snacks.

## Urban food production: back-yard hobby or valuable farming system?

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In our increasingly urbanised world, urban agriculture has attracted much attention for its ability to address environmental and social issues of the current food systems. Urban food production is uniquely placed to harness and reuse urban waste products, increase land use efficiency, and lower the greenhouse gas emissions associated with food production. However, urban agricultural research is often undertaken from an advocacy standpoint, rather than critically analysing the feasibility of large-scale production. Measuring available land and agricultural inputs is critical to understanding the capability of urban agriculture. Here, we investigate co-benefits of converting residential lawn to urban vegetable production via a case study of Adelaide, South Australia – a sprawling city, housing 1.3 million people. We developed a model that combines high-resolution spectral and LiDAR imagery, with productivity and irrigation data from an earlier citizen science project. Modelling revealed that residential lawn covers 4588 ha, enough to supply the population's vegetable requirements four times over. A more practical consideration is the number of properties able to achieve household self-sufficiency. Results indicate that approximately two-thirds of residential properties have enough land to meet their dietary vegetable requirements, while capturing and storing adequate rainwater for irrigation, even in a modelled dry year. The modelled edible garden and associated storage tank would occupy around half of the lawn space in a typical residential block. Additionally, Denitrification-Decomposition modelling has been used to compare urban lawn to vegetable gardens. Early results indicate that replacing urban lawn with vegetable production significantly reduces soil greenhouse gas emissions. Taken together, urban agriculture can produce significant amounts of food, potentially using urban waste products as agricultural inputs (e.g. compost), while lowering the global warming potential of urban greenspace. The scale at which urban agriculture can occur highlights the significant contribution these benefits could have toward sustainable food-systems.

## The functionality of physically modified lentils flours

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Plant sources offer a more sustainable way towards the increased global demand for proteins [1]. Currently, plant proteins are utilised in the form of isolates and concentrates. 1 kg of legume protein isolate is estimated to require approximately 3.571 kg seed, 80 kg water, 22 kg hexane, 40 g NaOH, 40 g HCl and 30 MJ energy with the creation of 30 wt% of the initial material as a by-product [2]. The high amount of energy and chemicals required could be avoided by utilising the whole material.

Ball milling (BM) can be used as a chemical and water-free method to modify the structural conformation of isolated starch granules [3] and proteins [4]. In this research, different times (2, 4 hours) of BM were used to modify whole flours from Green whole lentils (GWL) and Red split lentils (RSL). The functional properties of the modified flours, without extraction or fractionation, were evaluated. The birefringence and crystallinity of the lentils' starch granules decreased after 4h of BM due to mechanical energy, as expected. The increased water absorption (25 oC) of both lentils after 4h of BM could be attributed to the decrease in crystallinity. The formation of protein aggregates after 4h of BM decreased protein solubility, which again would be expected due to the denaturation of the proteins during BM.
A rapid visco analyser (RVA) was used to evaluate the pasting properties of all flours. Water absorption is linked with the ability of the starch granules to bind with water, swell and increase peak viscosity by creating restriction to flow. BM decreased peak viscosity possibly due to the changes in the flour microstructure with the proteins and the fibers acting as barriers, preventing the hydration, and pasting of the starch granules. The present study investigated the effect of increased duration of BM treatment on the functionality of whole flours from lentils. The functional properties including increased water absorption, loss of crystallinity and birefringence were established. Protein aggregation and decreased solubility by increasing the time of BM could be responsible for the lower pasting properties and the ability of the modified lentil flours to form a viscous paste.

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## Investigation of Environmentally Compliant Corrosion Inhibitors and comparison with Conventional Inhibitors using the Electrochemical Noise Method (EN)

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Adding a corrosion inhibitor to a water-based environment is an efficient and economic method used by oil and gas companies for the protection of steel flowlines and pipeline. The Electrochemical Noise Method (EN) is a non-invasive and quick technique that processes the natural signal fluctuations arising during the electrochemical reaction to calculate a parameter called Rn which can be related to corrosion current. In this work, EN is employed as the main monitoring method but comparison is made with the more commonly used Linear Polarisation Resistance (LPR) method. In addition, ICP-OES as an accurate analytical technique was employed to confirm the iron mass loss and compare it with that calculated from the EN results.

Initially 1% propargyl alcohol (PA) was tested in different concentrations (0.37, 2.6 and 5.5%) of HCl solution. Because the corrosion inhibitors currently used (like PA) are toxic and harmful to the environment, some potentially environmentally compliant inhibitors were investigated. A standard method to extract solution from green plants (broccoli and sugar beet, mainly root section) was used and these were then added in NaCl/CO2 or HCl solution. Comparison of these green inhibitors with low concentrations of two conventional inhibitors provided by an international chemical company with experience in oilfield corrosion inhibitors, was made in the 3% NaCl/CO2 environment at 21oC and 50oC. The conclusion so far is that sugar beet is the most promising inhibitor for the NaCl/CO2 or HCl environment. Also, that EN is an effective and efficient method of testing inhibitors. Future work will involve using the method to screen a number of potential green inhibitors eg extracted by different techniques. And having established which are the more promising inhibitors and which is the best extraction method, the extract of those will be analysed to get some clues as to active species.

## Optimising the nutritional and sensorial profile of plant based milk alternatives

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Plant based milk alternatives (PBAs) have increased in sales in the UK with a focus on oat milk in particular due to its increased sustainability. Benefits of oat milk alternatives (OMAs) include beta-glucans (fibre), leading to improved blood sugar control, lower cholesterol and improved immune function; as well as avenanthramides (polyphenolic alkaloids) which have shown anti-inflammatory, antiatherosclerosis and anticancer effects, and avencosides (saponins), noted for lowering cholesterol. However, nutritional and sensory features of OMAs may present a drawback. Bovine milk contains approximately 3.4% high quality protein with a complete amino acid profile, and calcium in a bioavailable form. Commercial OMAs typically contain just 0.3-1% protein, with oxalates and phytates potentially hindering absorption of calcium by forming insoluble complexes. The sensory profile may be affected by astringency, resulting from aventhramides and avenacosides binding to salivary proteins and reducing lubrication. Differences in stability, appearance, taste, and mouthfeel may also affect overall acceptability of OMAs. The objective of this study, is to address the challenges of OMAs, investigate methods to overcome them, and develop an OMA model with an optimised sensorial and nutritional profile. An initial project was carried out to investigate the sensory, flavour and physiochemical profiles of six commercially available OMAs. Techniques included GC-MS, GC-O, LC-MS, sensory, particle size, and colour analyses. The aim of this study is to gain an insight on current correlations between profiles to be used to develop a new oat milk model.

The results of the initial study have so far shown many correlations between the sensory attributes the flavour profile, as well as the physiochemical properties. This information will be used in the next step of the project, in production of an oat milk alternative model used to investigate methods to optimise the nutritional profile, whilst improving the sensory and physiochemical profile.

## The processing stability of oil-in-water food emulsion stabilised by insect proteins

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The increasing global population and consumer demand for protein will render the provision of protein a serious future challenge. The lower environmental impact of insect farming makes the consumption of insects an appealing solution, although consumers in developed countries often respond to the idea of eating insects with disgust. One approach to accustom consumers to insects as part of their diet is through the application of functional insect protein extracts as food ingredients.

Protein extracts from *Tenebrio molitor* (mealworm) in both larval and beetle forms, *Galleria mellonella* (waxworm) larvae and *Gryllodes sigillatus* (banded cricket) were produced through an alkali extraction method. The extracts were used to produce Oil-in-water emulsions pH 7, 20 °C with 20 % sunflower oil. The emulsions were subjected to different types of environmental stress such as temperature (-20 °C, 20 °C and 80 °C), pH (5 and 7) and surfactant addition (polysorbate 20 at 0 – 1%) to evaluate if insect protein could be used as an emulsifier in a commercial manufactured food product. Emulsions from all four insect protein extracts produced stable oil-in-water emulsions at pH 7, confirmed through microscopy, with mean volume-based droplet diameters of 13.6 – 18.7 µm and no significant difference with added polysorbate 20 or when heat processed. Adjusting to pH 5 without added polysorbate 20, showed no change in droplet diameter unless heat processed. With added polysorbate 20, the mealworm beetle protein stabilised emulsions showed no significant difference in droplet diameter when adjusted to pH 5, whereas mealworm larvae, waxworm larvae and banded crickets increased. These results suggest that at neutral pH proteins derived from multiple taxonomic orders and life stages can form stable oil-in-water food emulsions. However, at pH 5 in the presence of a common non-ionic surfactant the specific species and life stage of the insect influences emulsion stability.

## Establishing the functionality of arabinoxylans as bread ingredients using the Chopin Mixolab and Rapid Visco Analyser

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Arabinoxylans (AX) are potentially a valuable co-product of biorefineries, offering a new class of functional food ingredients, particularly for bakery products. The diverse range of potential AX feedstocks and products gives rise to the challenges of characterising these novel materials, defining processes to produce a range of fractions, and creating markets and end-uses for those fractions. Current work is testing AX extracted from sugarcane bagasse, wheat bran and oat husks in different size fractions for their functionality in bread dough formulations using a Chopin Mixolab and Rapid Visco Analyser. AX fractions with larger molecular weights increase dough water absorption and development time, and interact with starch gelatinisation. The RVA showed that both water extractable and water unextractable AX decreased the peak viscosity with a slight increase of final viscosity at low concentrations. Technoeconomic analysis shows that co-producing a portfolio of AX products with bioethanol production gives process integration opportunities that enhance the economics and environmental benefits. As well as promising in their own right, AX also illustrate a larger vision in which synergies between biorefining and the food industry are exploited in order to provide the food industry with novel ingredients that are not currently commercially available.

## Understanding the saltiness perception of samphire as a potential salt substitute for food

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The halophytic species like Salicornia have recently been explored as a substitute for salt used in meat products. However, there is limited understanding of the mechanism for saltiness perception. The objective of this study was to determine the composition of samphire extracts and understand the impact on sensory profile when used in a food product. Fresh samphire was freeze-dried and analysed for mineral and amino acid content. Freeze-dried samphire extract was added into a nachos base at 2.5% and 3.4% (w/w), while nachos with 0.7% and 1.0% salt (NaCl) were used as controls to be equivalent in sodium content. Sensory profiling using a structured general labelled magnitude scale (gLMS) was carried out by a trained sensory panel (n=14). The mineral analysis found minerals including Na (12-14g/100g), K (1-1.5g/100g) and Mg (0.3-0.5g/100g). While 16 free amino-acids, including lysine, glutamic acid, arginine known to influence salty taste, were also present. The sensory results concluded that 2.5% addition of samphire extract significantly increased salty taste compared to the control product at the equivalent sodium level (0.7% NaCl), from “weak” to “moderate” on the gLMS and reached comparable salty taste to the 1% salt control. However, no difference was observed in the salty taste when the samphire level was increased from 2.5% to 3.4%. Umami taste was also significantly higher with samphire samples compared to the salt controls, attributed to the presence of glutamic acid in the extracts. No attribute considered to be undesirable were highlighted by the panellists. In conclusion, the minerals and amino acids may collectively contribute to the salty taste of samphire extract. Therefore, samphire can be used to achieve sodium reduction in savoury snack products without introducing noticeable changes in flavour.

## The role of social supermarkets and redistribution of surplus food in the contribution to the mineral requirements of low-income population groups

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During the Covid-19 pandemic 14 social supermarkets (SSMs) opened in deprived areas of Coventry. These SSMs make food available in a dignified and affordable way to households who may be vulnerable to food insecurity. Unlike Food Banks, SSMs customers are not means tested and products comprise surplus foods sold at a discounted cost. It is hypothesized SSMs selling preselected food boxes provide a critical contribution to micronutrient intake in low-income groups. The nutritional composition of food boxes sold weekly at Grub Hub, Henley, Coventry between 1st -15th December 2021 was analyzed in Nutritics 2021. Boxes are constructed for 2 adult, 1 child households. The contribution towards micronutrient intake calculated for the household structure detailed above (HH2) and for 1 adult, 2 children (aged 11-14 years) households (HH1). The UK Government Dietary Reference Values for energy and nutrients were used to calculate a household mineral requirement.

Total cost of preselected food boxes was £4 per week and on average contained 21 portions of fruit and vegetables which equated to 1 portion (80g) per person, per day for the two household types. Energy provided was 358 kcal per person per day, of which carbohydrates were the main source (62%), followed by protein (20%) and fat (19%). Cereal products accounted for 66% of the iron and contributed 34% of HH1 and 29% of HH2 Reference Nutrient Intake (RNI). Animal products contributed 64% of the zinc and provided 21% of the RNI for HH1 and HH2, whilst milk and milk products provided 64% of the iodine and contributed 19% and 20% to the RNI respectively. The food items contribute significantly to the mineral intake of low-income population groups who have access to SSMs', whilst the amount of energy, fat, and salt did not exceed of requirements, thereby indicating the considerable value of this approach.

## Effect of processing treatments on the chemical composition and physicochemical properties of chempedak (*Artocarpus integer*) seed flour

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Chempedak (Artocarpus integer) is a tropical fruit that can be found widely cultivated in Southeast Asia. The seeds, which represent about 10-25% of the fruit, are normally discarded as waste. Research into the utilization of chempedak seed is very limited and presents an opportunity to be used as a food ingredient. The aim of this research was to investigate the effect of different treatments such as oven-drying (OD), hydrothermal (H) processing and germination (G) on the chemical composition, total phenolic content (TPC) and antioxidant capacity of chempedak seed flour. OD treatment of chempedak seeds without coat, produced flour with the highest carbohydrate content compared to G and H process (74.08%, 67.87%, and 67.71% respectively). In contrast, H treatment of chempedak seeds with coat resulted in a flour with the highest crude protein (15.38%) compared to that obtained by the OD and G process (12.69% and 12.45%, respectively). The G treatment of chempedak seeds with coat showed the highest crude fibre (6.51%) compared to H and OD treatments (5.21% and 3.80%, respectively). The highest TPC (211.95 mg GAE/mg) was observed for OD chempedak with coat flour, whereas the lowest levels were obtained following the H treatment (148.76 mg GAE/mg). Similarly, seed flours obtained after OD treatment without removal of the coat showed the highest significant ($p<0.05$) antioxidant activity. These results suggest that these different heat treatments and the removal of seed coats have an impact on the chemical composition and some physicochemical properties of chempedak flour and present an opportunity to consider this flour as a functional ingredient for food product applications.

## Valorisation of waste produce into active, sustainable food packaging

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Food packaging aims to provide protection, hygiene and ensure quality – a role traditional plastic packaging has performed well since its mainstream introduction. However, in recent years there has been a clear societal shift away from single-use plastics and toward more sustainable packaging materials. This research proposes that a tailored active packaging material can be created from food waste streams to increase the shelf-life and quality of foodstuffs prone to oxidation and microbial attack. Food waste from fresh produce and farm surplus are virtually untapped sources of natural compounds capable of antioxidant and antimicrobial action. Six waste sources were investigated in this work: apple, celery, oat, spent barley grain, sugar beet and tomato. All have been industrially dried and micronized to >150 µm. Colorimetric radical scavenging assays and minimum inhibitory concentration (MIC) assays were used to identify the food waste sources with greatest antioxidant capacity and antimicrobial activity. Biocomposite films containing renewable the biopolymer chitosan (itself a seafood by-product) and waste produce were developed and evaluated as a potential compostable packaging alternative to single-use plastic.

## Evaluation of defatted melon seeds as a functional food ingredient

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**Background:** Melon (Cucumis melo) seeds are regarded as a low value by-product within the melon supply chain and are often disposed as a waste. However, considering their high content in lipids, proteins, minerals and carbohydrates, they have the potential to be used as a renewable resources and create potential value through valorisation strategies.

**Objective:** The aim of this research is to investigate the proximate composition, mineral contents, functional properties of defatted melon seeds and evaluate their potential value as functional food ingredients.

**Design:** Proximal analysis was conducted initially, involving analysis of the protein, ash, moisture, and carbohydrate content of three different varieties of defatted melon seeds (DMS) (Galia, Cantaloupe, and Honeydew) and defatted pumpkin seed (DPS)(as control group). In addition, key functional properties of DMS were examined including water absorption capacity (WAC), oil absorption capacity (OAC), emulsifying capacity (EC), and foaming capacity (FC); commercial flour including wheat and corn and DPS were used as controls.

**Results:** Three varieties of DMS contained considerable levels of protein (51.05% to 54.24%), ash (8.10% to 9.72%) and insoluble dietary fibre (21.28% to 23.70%). All varieties of DMS have similar proximate compositions with DPS. Additionally, three varieties of DMS contained rich macrominerals such as potassium (over 1500mg/100g DW), and magnesium (over 800mg/100g DW). Besides, DMS functional properties perform well in WAC (1.57 to 1.97g/g), OAC (1.92 to 2.05g/g), and then are good on EC (47.47% to 50.74%) and FC (4.10% to 11.48%). Compared with control group at functional properties aspects, all varieties of DMS in WAC aspect were lower than DPS (2.45g/g) but were significantly higher than wheat flour (0.70g/g) and corn flour (0.77g/g); only defatted Honeydew melon seeds was slightly lower than DPS (49.26%) in EC aspect but also was as twice as wheat flour (21.24%).

**Conclusion:** DMS could be considered as a potential source of vegetable protein and minerals and could be used in protein or mineral fortified food.