

Seaweed algal fibre – a novel source of dietary fibre

TEAGASC researchers are collaborating with industry to obtain high-quality dietary fibre from Irish seaweed using a sustainable, biorefinery approach.

What is dietary fibre?

The beneficial role of dietary fibre in human nutrition is well documented. Dietary fibre is usually defined as the edible part of plants or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine, with complete or partial fermentation in the large intestine. The term 'dietary fibre' was first coined by Hipsley in 1953 to describe the non-digestible components of plants that make up the plant cell wall and include cellulose, hemicellulose and lignin. Later it was realised that a number of health benefits are associated with the consumption of dietary fibres, e.g., reduction in atherosclerosis, and in heart and gastrointestinal diseases. The definition of dietary fibre was expanded to include other non-digestible polysaccharides. Dietary fibres are generally classified as soluble (SDFs) and insoluble (IDFs). SDFs are widely used as food additives (thickeners, stabilisers, emulsifiers and gelling agents). These are quickly and extensively degraded and fermented in the large intestine, whereas IDFs are often degraded slowly, and partially degraded DFs are fermented. Research studies have shown a consistent association between IDFs and protection against cancer, compared to SDFs. Various sources of dietary fibre including oats, barley, rye, wheat bran and sugar beet have gained European Commission health and nutritional claim status (Commission Regulation 432/2012) (**Table 1**). Generally, it is recommended that the consumption of 25-38 g of dietary fibre per day, depending on calorie intake, will have health benefits (<https://ec.europa.eu/jrc/en/health-knowledge-gateway/promotion-prevention/nutrition/fibre>).

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Algal fibre

Fucus vesiculosus or bladder wrack is a brown seaweed commonly found in west coastal areas of Ireland, and also in temperate or cold waters of the Atlantic and Pacific Oceans. *Fucus* is well known for several health benefit compounds, namely phlorotannins, fucoidans, laminarin, alginates, dietary fibre, essential minerals and vitamins, which are linked to a range of biological functions including antioxidant, anti-inflammatory, anti-tumour, anti-obesity, anti-coagulant, anti-diabetes and others. Algal fibre obtained from *Fucus* is also an excellent source of dietary fibre, and has been reported to impart similar improvements in human gastrointestinal health and other benefits to those obtained from dietary fibres in terrestrial plants.

Table 1: Authorised health benefits of various sources of functional fibre (EC 432/2012).

Fibre source	Claimed benefits
Oat fibre	Increase in faecal bulk; reduction of postprandial glycaemic responses
Barley fibre	Increase in faecal bulk, reduction of postprandial glycaemic responses
Rye fibre	Changes in bowel function
Sugarbeet fibre	Increase in faecal bulk
Wheat fibre	Increase in faecal bulk; reduction of postprandial glycaemic responses; reduction in intestinal transit time
Algal fibre*	Laxation; gut health, blood lipid lowering; attenuates blood glucose

*Algal fibre obtained from *Fucus vesiculosus*; claims reported are based on research studies.

Teagasc researchers, in collaboration with Nutramara Ltd (Co. Kerry), under the SFI-funded BiOrbic – Bioeconomy Research Centre, have developed a green process to obtain high-quality algal fibre from Irish *Fucus*.

The proximate composition of algal fibre obtained is shown in Figure 1.

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The algal fibre is obtained from the *Fucus* via a biorefinery approach, which retains key biomolecules including fucoidans, mannitol, laminarin, alginates and dietary fibre, without the use of chemicals. The biorefinery approach for Irish-grown seaweeds is a step towards a sustainable and zero waste concept for the seaweed industry, adding value to Irish marine bioresources.

Acknowledgments

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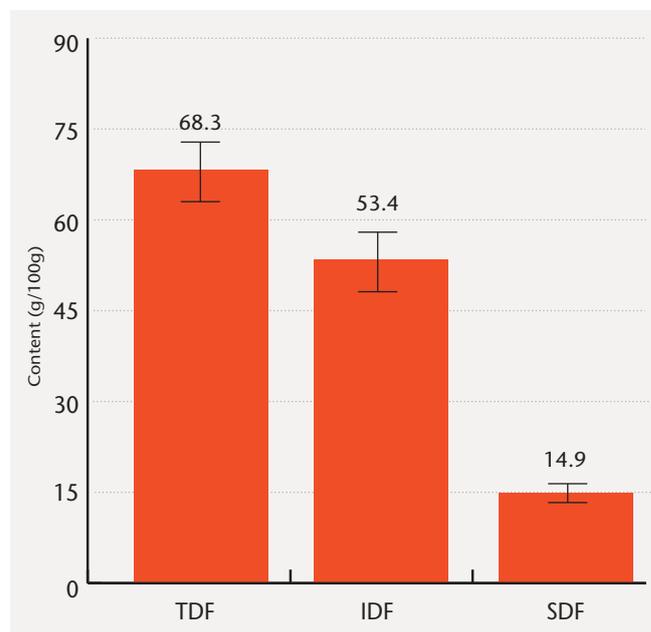


FIGURE 1: Total dietary fibre (TDF), insoluble dietary fibre (IDF) and soluble dietary fibre (SDF) obtained from *Fucus vesiculosus* (data expressed as g per 100 g of dry weight).

Reference

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