

Bioactivity Potential of New Zealand *Porphyra/Pyropia*: A Protein Centric Approach to Functional Food Discovery

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Abstract

Porphyra/Pyropia seaweeds from New Zealand are promising candidates for functional food development due to their high protein content and nutritional value. However, protein content alone does not determine functional performance in food systems, as health benefits are often mediated by bioactive peptides released during digestion.

This study evaluates three New Zealand species: *Pyropia virididentata*, *Pyropia cinnamomea*, and the *Porphyra* GRB complex integrating proteomic characterisation within silico digestion analysis. While all species exhibited similarly high protein contents (26 - 30.2%) and favourable amino acid profiles, proteomic data revealed substantial differences in protein composition, particularly in phycobiliprotein abundance.

Simulated gastrointestinal digestion predicted the release of peptides with potential angiotensin-converting enzyme (ACE) and dipeptidyl peptidase-IV (DPP-IV) inhibitory activities, with variation linked to species-specific protein profiles. These findings suggest that bioactive potential is driven not only by total protein content, but by the composition and digestibility of specific protein fractions. Allergenicity prediction further supported a low-risk profile, reinforcing their suitability for food applications.

The observed species-specific differences in protein composition and predicted peptide release highlight opportunities for targeted species selection and processing strategies to enhance bioactive functionality. Collectively, this supports the development of New Zealand *Porphyra/Pyropia* as sustainable, protein-based ingredients with optimised health-promoting potential for next-generation functional foods.

References

[1] Chee Fan Tan, Kuin Tian Pang, Rita Lee, Alok Tanala Patra, Felicia Ong, Ian Walsh, Siew Young Quek, Tom Wheeler, Xuezhi Bi (2026) *Proteomic profiling of New Zealand endemic Porphyra/Pyropia (karengo) seaweeds: a predictive framework for functional food applications*. Future Foods 13: 100938
