

SUSTAINABLE FOOD INNOVATIONS:

PRODUCT DEVELOPMENT, PACKAGING, AND WASTE VALORIZATION

**Innovations in Sustainable Food Processing,
Functional Foods and Smart Technologies**

Edited by

**Kamlesh Prasad, PhD
Shubhra Shekhar, M. Tech.
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**Sant Longowal Institute of Engineering and Technology,
Longowal – 148106, Sangrur, Punjab, INDIA**

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Published By

Publication Division
Sant Longowal Institute of Engineering and Technology,
Longowal - 148106 (Punjab) INDIA

Sustainable Food Innovations: Product Development, Packaging, and Waste
Valorization

Sant Longowal Institute of Engineering and Technology, Longowal,
(Punjab) INDIA

SLIET Communication No. 4401/18112025

ISBN: 978-81-990304-3-5 (Hardback)

ISBN: 978-81-990304-2-8 (e-Book)

About the Editor

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Prof. Kamlesh Prasad is a distinguished academician, researcher, and food technologist with extensive experience in teaching, research, academics, administration, and scholarly publishing. He is currently serving as Professor in the Department of Food Engineering and Technology at Sant Longowal Institute of Engineering and Technology (SLIET), Longowal, Punjab, India. In addition to his academic responsibilities, he has served as Head of the Department (Food Engineering and Technology), Coordinator of the Internal Quality Assurance Cell (IQAC), Chairman of the Rajbhasha Hindi Cell, and Public Grievance Officer (PGO) of the institute. He is also the Chairman of the Conference on Future Innovations, Food Allergies, and Traditional Foods (FIFATF-2025 and FIFATF-2026).

Prof. Prasad obtained his postgraduate degree in Food Technology from the CSIR-CFTRI, Mysore. He subsequently earned his doctoral degree in Food Technology from GBPUA&T, Pant Nagar. His major areas of specialisation include fruit and vegetable processing, non-destructive quality evaluation of foods, image analysis, food process optimisation, nanotechnology applications in food systems, engineering properties of biological materials, innovative food processing technologies, and traditional foods to combat hidden hunger.

Prof. Prasad has authored and co-authored more than 200 research papers published in reputable national and international journals and conference proceedings. He has also authored several books, edited scholarly volumes, and contributed chapters to books published by leading national and international publishers. His publications have served as valuable references for researchers, students, and professionals in food science, food engineering, and postharvest technology. Also associated with several prestigious professional societies and scientific organisations, including the ASABE, IFT, AFST(I), NSI, USI, IEEE, and other national and international professional bodies. In addition to his research accomplishments, Prof. Prasad has actively contributed to academic leadership, curriculum development, student mentoring, and research capacity building.

This edited book is being published as part of the conference proceedings, reflecting his commitment to advancing research and disseminating knowledge in these critical domains.

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Mr Shubhra Shekhar is a PhD candidate in the School of Chemical Engineering at the University of New South Wales (UNSW), Sydney, Australia. He is currently a member of the Faculty Board, holds higher-degree research student positions in engineering, has served as President of the Chemical Engineering Research Society (CERS), and is a member of the AGSE Industry PhD cohort, actively engaging with both industry and academic partners. His research focuses on non-destructive sensing and advanced characterisation methods to improve quality assurance and process understanding in modern food systems. His work brings together principles from chemical engineering, computer science, and data-driven modelling to develop innovative approaches for analysing complex food products and their behaviour.

He is a GATE achiever and has completed an M. Tech. (Food Process Engineering) from NIT, Rourkela. He received the Best Student Award from the Association of Food Scientists and Technologists, India (AFSTI), Mysuru, in 2021 and ranked top in the deemed-to-be university at graduation. He was also the All-India Topper (Elite) and received a Silver Medal for the NPTEL Course conducted by IIT Kharagpur. Got an appreciation letter from Nestle India Ltd., Moga, for his contributions in the form of recommendations. Won several prizes in academics, co-curricular and extracurricular activities. Received letters of appreciation for his contributions to several events and activities. He has successfully delegated his responsibilities as the in-charge of the Society of Food Technocrats (SOFT), the Photography Club (SVIESA), and numerous other professional committees and events. He has industrial exposure with Mondelez India Foods Private Limited, Baddi, HP; Mrs Bector's Food Specialities Limited, Greater Noida, UP; and Nestle India Limited, Moga, Punjab. He is a widely travelled person and has visited countries including Australia, Switzerland, Italy, France, Vatican City, Belgium, the Netherlands, Germany, the Czech Republic, Austria, Hungary, Singapore, Thailand, and Hong Kong. His work is published as articles in books, journals, and conference proceedings of international repute.

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Harish Kumar Sharma S/o Mrs Sharda Sharma and Late Shri M. M. S. Sharma is a Professor (HAG) of Sant Longowal Institute of Engineering & Technology (SLIET) (Deemed University) (Established by: Government of India) and worked as Director, National Institute of Technology (NIT) (An Institution of National Importance), Agartala and Founder Mentor Director of Indian Institute of Information Technology (IIIT), Agartala. Professor Sharma is involved in Teaching, Research, and Administration and has published 167 papers in peer-reviewed Journals and a total of 205 papers in National/International Journals/Proceedings. He has supervised 18Ph.Ds and 44 M.Tech. students for their theses and authored/edited (10) books, (02) proceedings, and (02) manuals, published by reputed National and International Publishing Houses. He contributed 34 book chapters published by National and International Publishing Houses and visited different countries. Professor Sharma has successfully handled several projects and successfully transferred technology on a commercial scale. He has filed two patents, holds four copyrights, and provided technical assistance to various industries.

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Preface

It gives us immense pleasure to present ***Sustainable Food Innovations: Product Development, Packaging, and Waste Valorization***, an edited volume bringing together the research contributions addressing important contemporary challenges and opportunities in sustainable food processing, food product development, packaging, and resource valorization.

The food sector increasingly needs to meet growing demand for nutritious, safe, affordable, high-quality foods while using natural resources efficiently and reducing food and agricultural waste. Sustainable food innovation therefore requires approaches that integrate product development, nutritional improvement, efficient processing, waste reduction, value addition, and environmentally responsible packaging.

The book comprises fourteen chapters covering diverse themes. These include food applications for addressing celiac disease, techno-economic evaluation of wheat bran for fibre-rich food products, rice straw for sustainable packaging, utilization of underexplored banana species, food allergen reduction using cold plasma, and the nutritional and functional potential of tangerine peel waste.

Several chapters emphasize the valorization of underutilized crops and food resources. The volume includes studies on Tardi (*Dioscorea bellophylla*) starch, amla cultivars, multi-millet formulations, bitter gourd, jute leaves, asparagus bean flour, dietary-fibre recovery, and bioactive compounds from stinging nettle. These contributions show the potential of diverse plant resources and food-processing residues as sources of nutrients, functional ingredients, bioactive compounds, and value-added food products.

The book also highlights sustainable packaging and innovative processing technologies. Converting rice straw into packaging materials offers a way to create value from agricultural residue, while starch-based antimicrobial films show the potential of renewable materials for functional packaging applications. Other contributions address cold plasma treatment, drying technologies, extraction processes, and hydrothermal recovery of dietary fibre.

An important feature of this volume is its multidisciplinary approach, bringing together perspectives from food technology, food engineering, agricultural sciences, nutrition, biotechnology, materials science, and related disciplines.

We hope that “*Sustainable Food Innovations: Product Development, Packaging, and Waste Valorization*” will serve as a useful reference for researchers, academicians, postgraduate and doctoral students, food technologists, engineers, industry professionals, and other stakeholders.

We sincerely thank all the authors, reviewers, institutions, colleagues, students, and supporters whose contributions have made this volume possible.

K. Prasad, S. Shekhar, and H. K. Sharma (Editors)

Acknowledgement

The publication of *Sustainable Food Innovations: Product Development, Packaging, and Waste Valorization* has been made possible through the collective efforts, cooperation, and support of numerous individuals and institutions. As editors, we sincerely acknowledge everyone who contributed to preparing and completing this volume.

First, we express our heartfelt gratitude to all the contributing authors for sharing their research findings, knowledge, and expertise. The fourteen chapters covering sustainable food product development, agricultural and food-waste valorization, sustainable packaging, functional ingredients, food allergen management, processing technologies, nutritional enhancement, dietary-fibre recovery, and bioactive compounds form the foundation of this book.

We sincerely thank the reviewers and subject experts for their valuable time, critical evaluation, and constructive suggestions. Their scholarly inputs have helped improve the quality, scientific content, and presentation of the chapters.

We gratefully acknowledge Sant Longowal Institute of Engineering and Technology (SLIET), Longowal, for providing the institutional support and academic environment necessary for this scholarly initiative. We particularly appreciate the support of all FIFATF-2025 sponsors in bringing this edited volume to publication.

We also acknowledge the valuable contribution of the Department of Food Engineering and Technology, SLIET, Longowal, whose academic and research environment continues to encourage innovation and knowledge dissemination in food engineering and technology.

We extend our sincere thanks to the collaborating institutions and academic partners whose researchers contributed to this volume. We particularly acknowledge the association of researchers from national and international institutions.

We thank our research scholars, students, faculty members, colleagues, collaborators, and well-wishers for their valuable support, encouragement, and academic contributions. We also appreciate the efforts of all those who assisted with manuscript preparation, editing, compilation, formatting, proofreading, correspondence, and publication. Special thanks to my scholars, Gunjan Thakur and Sunil Kumar, for their efforts in shaping this book in its present form.

Finally, we express our heartfelt gratitude to our families and friends for their patience, encouragement, and continued support throughout the preparation of this book. Thanks are also extended to the administrations of the institute and the Ministry of Food Processing Industry for their support.

We sincerely hope that this volume will contribute to advancing research and innovation in sustainable food product development, resource-efficient processing, sustainable packaging, agricultural and food-waste valorization, nutritional enhancement, and the development of environmentally and economically sustainable food systems.

K. Prasad, S. Shekhar, and H. K. Sharma (Editors)

Hydrothermal treatment for the recovery of dietary fiber

Rishabh Thakur  and Harish Kumar Sharma 

Abstract. Hydrothermal treatment has emerged as a green and versatile technology to recover DF from food and food by-products. This chapter critically examines the application of hot-water, subcritical water, steam-explosion, saturated steam, and autoclaving for the recovery of DF. The use of high temperature and pressure facilitates matrix hydration and swelling, improves heat and mass transfer, disrupts non-covalent interactions, and cleavage of glycosidic/ ester linkages. Studies showed that the severity of hydrothermal treatment governs the fiber recovery, conversion of insoluble fiber into soluble fraction, and degradation into oligosaccharides. The mild hydrothermal treatment (hot-water) promotes dissolution and diffusion, whereas subcritical water and steam explosion induce extensive depolymerization and microstructural disruption in the polysaccharide matrix. On the other hand, autoclaving emerged as an intermediate treatment that combines moist heat, moderate pressure, and partial hydrolysis. In the present chapter, we summarize the research performed so far and compare the extraction yield, compositional change, and functional outcomes of the DF obtained after different hydrothermal treatments. Future studies should be performed on matrix-specific optimization of hydrothermal process conditions and its integration with other DF extraction techniques.

Keywords: Hydrothermal treatment; dietary fiber extraction; subcritical water; steam-explosion; autoclaving.

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ISBN: 978-81-990304-3-5 (Hardback), 978-81-990304-2-8 (e-Book)

1. Introduction

The complex carbohydrates (polymers) associated with plants, which exhibit resistance to digestion in the small intestine, are referred to as dietary fiber (DF). Essentially, DF are the plant cell wall polysaccharides (Thakur and Sharma, 2026a). Industries and researchers have shown increasing interest in developing DF-enriched functional foods due to a recent surge in demand for DF. Although most horticultural produce (fruits and vegetables) is rich in DF, people rarely meet the recommended daily DF intake. Despite high recommended DF intake (men: 38 g and women: 25 g/day), average daily intake is around 15 g/day (USDA, 2010). Therefore, interventions in existing food formulations, incorporating DF into processed foods, or supplementing existing foods with DF have become the need of the hour. Apart from horticultural produce, cereals, and grains, the processing by-products of fruit and vegetables, legumes, cereal grains, tuber crops, and oilseeds are also very rich in DF (Cui et al., 2019; Hussain et al., 2020; Islam et al., 2023; Nevara et al., 2021; Pathania and Kaur, 2022; Saini et al., 2023). Household and processing by-products generated from fruits and vegetables (peel, pomace, pods, seed, husk, or residues) and cereal grains (bran, husk, straw) make up 40-50% and 30% of total food waste, respectively (Plakantonaki et al., 2023). Therefore, the extraction of high-value compounds, viz. polyphenols, pigments, or dietary fiber from these wastes is of great significance (Kaur et al., 2022; Prakash et al., 2024; Prakash et al., 2023; Prasad et al., 2022). Various conventional and modern (physical, chemical, and biological) extraction techniques are used to recover DF. Among physical approaches, ultrasound, microwave, pulse electric field, cold plasma, hot-water extraction, subcritical water, etc. are primarily used to extract DF (Chen et al., 2019; Ibrahim et al., 2024; Mehta et al., 2022; Shekhar et al., 2023; Thakur and Sharma, 2026b; Yan et al., 2019). Hydrothermal treatment involves exposure to elevated temperatures, with or without pressure, to physically disrupt plant cell wall polysaccharides. This approach ranges from simple hot water to hot-compressed water (HCW), subcritical water (SW), steam explosion, or autoclaving. Studies on hydrothermal treatment for DF extraction are fewer. Nonetheless, hydrothermal treatment has been shown to yield good DF yields; however, studies on DF extraction using hydrothermal techniques remain far fewer than those on phenolics extraction.

5. Conclusion

Hydrothermal treatments are versatile and comparatively green techniques that can extract DF from food materials and agro-industrial by-products. The studies conclude that hydrothermal treatment can improve the accessibility & recovery of DF, loosen compact polysaccharide structure, and improve the techno-functionality of the fiber. Nevertheless, the outcome of the applied treatment depends on the matrix and processing conditions. Under severe hydrothermal conditions, as in SWE and steam explosion, polysaccharides are more extensively degraded and IDF is more fully converted to SDF. The treated DF exhibited a lower molecular weight, increasing its solubility. The chapter also highlights the application potential of hydrothermal treatments as a pretreatment to recover greater yields of DF.

Future research should be performed to optimize the hydrothermal processing conditions. Matrix-specific processing conditions should be standardized, and mass-balance analysis should be performed to experimentally distinguish extraction, solubilization, conversion, and degradation of DF. Moreover, the integration of hydrothermal techniques with other techniques like ultrasonication, enzymes, acid hydrolysis, membrane concentration, etc. needs to be explored in depth.

References

- AACC, F.C., (2001). The definition of dietary fiber: Report of the Dietary Fiber Definition Committee to the Board of Directors of the American Association of Cereal Chemists. *Cereal Foods World* 46(3), 112-126.
- Anoraga, S.B., Shamsudin, R., Hamzah, M.H., Sharif, S., Saputro, A.D., Basri, M.S.M., (2024). Optimization of subcritical water extraction for pectin extraction from cocoa pod husks using the response surface methodology. *Food Chemistry* 459, 140355. <https://doi.org/https://doi.org/10.1016/j.foodchem.2024.140355>
- Basak, S., Annature, U.S., (2022). The potential of subcritical water as a “green” method for the extraction and modification of pectin: A

- critical review. *Food Research International* 161, 111849.
<https://doi.org/https://doi.org/10.1016/j.foodres.2022.111849>
- Benito-Román, Ó., Alonso-Riaño, P., Díaz de Cerio, E., Sanz, M.T., Beltrán, S., (2022). Semi-continuous hydrolysis of onion skin wastes with subcritical water: Pectin recovery and oligomers identification. *Journal of Environmental Chemical Engineering* 10(3), 107439.
<https://doi.org/https://doi.org/10.1016/j.jece.2022.107439>
- Chandrasekara, A., Josheph Kumar, T., (2016). Roots and Tuber Crops as Functional Foods: A Review on Phytochemical Constituents and Their Potential Health Benefits. *International Journal of Food Science* 2016(1), 3631647.
<https://doi.org/https://doi.org/10.1155/2016/3631647>
- Chen, H., He, S., Sun, H., Li, Q., Gao, K., Miao, X., Xiang, J., Wu, X., Gao, L., Zhang, Y., (2023). A Comparative Study on Extraction and Physicochemical Properties of Soluble Dietary Fiber from Glutinous Rice Bran Using Different Methods, *Separations*, p. 90.
<https://doi.org/10.3390/separations10020090>
- Chen, X., Huang, C., Jian, R., Zhang, Y., Wu, W., Tang, X., Tan, Q., Sheng, Z., Zhang, K., (2019). Optimization of microwave-assisted extraction of soluble dietary fiber from potato pulp and its properties. *Journal of Food Processing and Preservation* 43(10), e14204. <https://doi.org/https://doi.org/10.1111/jfpp.14204>
- Cheng, Y., Xue, F., Yu, S., Du, S., Yang, Y., (2021). Subcritical Water Extraction of Natural Products, *Molecules*, p. 4004.
<https://doi.org/10.3390/molecules26134004>
- Cui, J., Lian, Y., Zhao, C., Du, H., Han, Y., Gao, W., Xiao, H., Zheng, J., (2019). Dietary Fibers from Fruits and Vegetables and Their Health Benefits via Modulation of Gut Microbiota. *Comprehensive Reviews in Food Science and Food Safety* 18(5), 1514-1532.
<https://doi.org/https://doi.org/10.1111/1541-4337.12489>
- Cui, Y., Wang, S., Wang, S., Cao, S., Wang, X., Lü, X., (2022). Extraction optimization and characterization of persimmon peel pectin extracted by subcritical water. *Food Chemistry: X* 16, 100486. <https://doi.org/https://doi.org/10.1016/j.fochx.2022.100486>

- Du, X., Bai, X., Gao, W., Jiang, Z., (2019). Properties of soluble dietary fibre from defatted coconut flour obtained through subcritical water extraction. *International Journal of Food Science and Technology* 54(4), 1390-1404. <https://doi.org/10.1111/ijfs.14071>
- EFSA, (2010). Outcome of the Public Consultation on the Draft Opinion of the Scientific Panel on Dietetic Products, Nutrition, and Allergies (NDA) on establishing Food-Based Dietary Guidelines. *EFSA Journal* 8(3), 1506.
- Fuso, A., Viscusi, P., Righetti, L., Pedrazzani, C., Rosso, G., Manera, I., Rosso, F., Caligiani, A., (2023). Hazelnut (*Corylus avellana* L.) shells as a potential source of dietary fibre: impact of hydrothermal treatment temperature on fibre structure and degradation compounds. *Journal of the Science of Food and Agriculture* 103(15), 7569-7579. <https://doi.org/https://doi.org/10.1002/jsfa.12837>
- Gereniu, C.R.N., Saravana, P.S., Chun, B.-S., (2018). Recovery of carrageenan from Solomon Islands red seaweed using ionic liquid-assisted subcritical water extraction. *Separation and Purification Technology* 196, 309-317. <https://doi.org/https://doi.org/10.1016/j.seppur.2017.06.055>
- Gonçalves, B., Pinto, T., Aires, A., Morais, M.C., Bacelar, E., Anjos, R., Ferreira-Cardoso, J., Oliveira, I., Vilela, A., Cosme, F., (2023). Composition of Nuts and Their Potential Health Benefits—An Overview, *Foods*, p. 942. <https://doi.org/10.3390/foods12050942>
- Hussain, S., Jōudu, I., Bhat, R., (2020). Dietary Fiber from Underutilized Plant Resources—A Positive Approach for Valorization of Fruit and Vegetable Wastes, *Sustainability*, p. 5401. <https://doi.org/10.3390/su12135401>
- Ibrahim, M.S., Nadeem, M., Khalid, W., Ainee, A., Roheen, T., Javaria, S., Ahmed, A., Fatima, H., Riaz, M.N., Khalid, M.Z., Mohamed Ahmed, I.A., Aljobair, M.O., (2024). Optimization of ultrasound assisted extraction and characterization of functional properties of dietary fiber from oat cultivar S2000. *LWT* 197, 115875. <https://doi.org/https://doi.org/10.1016/j.lwt.2024.115875>
- Islam, M., Saini, P., Das, R., Shekhar, S., Sinha, A.S.K., Prasad, K., (2023). Rice Straw as a Source of Nanocellulose Fibers for the

- Sustainable Food Packaging Materials: A Review. *BioResources* 18(1), 2351-2385. <https://doi.org/10.15376/biores.18.1.Islam>
- Jaramillo-Carmona, S., Rodríguez-Arcos, R., Guillén-Bejarano, R., Jiménez-Araujo, A., (2019). Hydrothermal treatments enhance the solubility and antioxidant characteristics of dietary fiber from asparagus by-products. *Food and Bioproducts Processing* 114, 175-184. <https://doi.org/https://doi.org/10.1016/j.fbp.2018.12.008>
- Kaur, R., Goyal, N., Panesar, G., Panesar, P.S., (2025). Unraveling the nutritional potential of millet by-products through extraction of high value compounds for the development of novel food products. *Food Chemistry* 472, 142983. <https://doi.org/https://doi.org/10.1016/j.foodchem.2025.142983>
- Kaur, R., Panesar, P.S., Kaur, B., Riar, C.S., (2024). Hydrothermal extraction of dietary fiber from pearl millet bran: optimization, physico-chemical, structural and functional characterization. *Journal of Food Science and Technology* 61(8), 1536-1546. <https://doi.org/10.1007/s13197-023-05921-x>
- Kaur, R., Shekhar, S., Prasad, K., (2022). Secondary Metabolites of Fruits and Vegetables with Antioxidant Potential, *Secondary Metabolites - Trends and Reviews*, InTech Press, London. <https://doi.org/10.5772/intechopen.103707>
- Keskin, S.O., Ali, T.M., Ahmed, J., Shaikh, M., Siddiq, M., Uebersax, M.A., (2022). Physico-chemical and functional properties of legume protein, starch, and dietary fiber—A review. *Legume Science* 4(1), e117. <https://doi.org/https://doi.org/10.1002/leg3.117>
- Kim, Y., Kreke, T., Ladisch, M.R., (2013). Reaction mechanisms and kinetics of xylo-oligosaccharide hydrolysis by dicarboxylic acids. *AIChE Journal* 59(1), 188-199. <https://doi.org/https://doi.org/10.1002/aic.13807>
- Klinchongkon, K., Chanthong, N., Ruchain, K., Khuwjitjaru, P., Adachi, S., (2017). Effect of Ethanol Addition on Subcritical Water Extraction of Pectic Polysaccharides from Passion Fruit Peel. *Journal of Food Processing and Preservation* 41(5), e13138. <https://doi.org/https://doi.org/10.1111/jfpp.13138>

- Li, S., Chen, G., Qiang, S., Tang, D., Chen, Y., Zhang, Z., Lei, Z., Chen, Y., (2019). Intensifying soluble dietary fiber production and properties of soybean curd residue via autoclaving treatment. *Bioresource Technology Reports* 7, 100203.
<https://doi.org/https://doi.org/10.1016/j.biteb.2019.100203>
- Li, Y., Hong, S., Xu, Z., Yang, J.M., Sivakumar, K., Rajpurohit, B., Li, Y., Haff, R., Vandemark, G., Huang, H., Xu, Y., (2026). Compositional, structural, and functional properties of dietary fiber from Desi chickpea hulls affected by extraction approaches. *Journal of Food Measurement and Characterization* 20(3), 3423-3437.
<https://doi.org/10.1007/s11694-025-03881-8>
- Liew, S.Q., Teoh, W.H., Tan, C.K., Yusoff, R., Ngoh, G.C., (2018). Subcritical water extraction of low methoxyl pectin from pomelo (*Citrus grandis* (L.) Osbeck) peels. *International Journal of Biological Macromolecules* 116, 128-135.
<https://doi.org/https://doi.org/10.1016/j.ijbiomac.2018.05.013>
- Lin, C.-P., Liu, Y.-H., Wang, S.-X., Tai, T.-C., Tsai, S.-Y., (2023). Thermal stability and characteristics of enoki mushroom dietary fiber by autoclaving pretreatment combined with enzymatic hydrolysis. *Journal of Thermal Analysis and Calorimetry* 148(14), 6807-6818. <https://doi.org/10.1007/s10973-023-12247-5>
- Liu, Y., Ao, H.-p., Zheng, J.-X., Liang, Y.-x., Ren, D.-F., (2022). Improved functional properties of dietary fiber from *Rosa roxburghii* Tratt residue by steam explosion. *Journal of Food Processing and Preservation* 46(1), e16119.
<https://doi.org/https://doi.org/10.1111/jfpp.16119>
- Ma, X., Jing, J., Wang, J., Xu, J., Hu, Z., (2020). Extraction of Low Methoxyl Pectin from Fresh Sunflower Heads by Subcritical Water Extraction. *ACS Omega* 5(25), 15095-15104.
<https://doi.org/10.1021/acsomega.0c00928>
- Ma, X., Zhang, Y., Chu, X., Wei, L., Li, P., Yu, K., (2025a). Effects of steam explosion on the structural, physicochemical, and functional characteristics of dietary fiber in sorghum grains. *LWT* 218, 117522.
- Ma, Y., Zhong, Y., Wang, Z., Zhou, Y., Murat Khan, M., Liu, M., Lü, X., Wang, X., (2025b). Recent advances in the application of subcritical

- water to plant and fungi polysaccharides preparation: A review. *International Journal of Biological Macromolecules* 322, 146720. <https://doi.org/https://doi.org/10.1016/j.ijbiomac.2025.146720>
- Mehta, D., Purohit, A., Bajarh, P., Yadav, K., Shivhare, U.S., Yadav, S.K., (2022). Cold plasma processing improved the extraction of xylooligosaccharides from dietary fibers of rice and corn bran with enhanced in-vitro digestibility and anti-inflammatory responses. *Innovative Food Science & Emerging Technologies* 78, 103027. <https://doi.org/https://doi.org/10.1016/j.ifset.2022.103027>
- Morales, D., Smiderle, F.R., Villalva, M., Abreu, H., Rico, C., Santoyo, S., Iacomini, M., Soler-Rivas, C., (2019). Testing the effect of combining innovative extraction technologies on the biological activities of obtained β -glucan-enriched fractions from *Lentinula edodes*. *Journal of Functional Foods* 60, 103446. <https://doi.org/https://doi.org/10.1016/j.jff.2019.103446>
- Naibaho, J., Korzeniowska, M., Wojdyło, A., Figiel, A., Yang, B., Laaksonen, O., Foste, M., Vilu, R., Viard, E., (2021). Fiber modification of brewers' spent grain by autoclave treatment to improve its properties as a functional food ingredient. *LWT* 149, 111877. <https://doi.org/https://doi.org/10.1016/j.lwt.2021.111877>
- Nevara, G.A., Muhammad, S.K., Zawawi, N., Mustapha, N.A., Karim, R., (2021). Dietary Fiber: Fractionation, Characterization and Potential Sources from Defatted Oilseeds, *Foods*, p. 754. <https://doi.org/10.3390/foods10040754>
- Ni, Z.Z., Li, J.T., Qian, X.Y., Yong, Y.D., Lv, W.D., Wang, Y.N., Zhang, S.M., Sun, H.K., Peng, G., Shao, Y., Chen, A.H., (2023). Optimisation of ultrasonic-assisted hot-water extraction conditions of soluble dietary fibre from *Lentinula edodes* and analysis of its hypolipidaemic and anti-inflammatory properties in STZ-induced diabetic mice. *Acta Alimentaria* 52(4), 558-569. <https://doi.org/https://doi.org/10.1556/066.2023.00128>
- Özkaya, B., Turksoy, S., Özkaya, H., Duman, B., (2017). Dephytinization of wheat and rice brans by hydrothermal autoclaving process and the evaluation of consequences for dietary fiber content, antioxidant activity and phenolics. *Innovative Food*

- Science & Emerging Technologies 39, 209-215.
<https://doi.org/https://doi.org/10.1016/j.ifset.2016.11.012>
- Pathania, S., Kaur, N., (2022). Utilization of fruits and vegetable by-products for isolation of dietary fibres and its potential application as functional ingredients. *Bioactive Carbohydrates and Dietary Fibre* 27, 100295.
<https://doi.org/https://doi.org/10.1016/j.bcdf.2021.100295>
- Perez-Pirotto, C., Cozzano, S., Hernando, I., Arcia, P., (2023). Different green extraction technologies for soluble dietary fibre extraction from orange by-product. *International Journal of Food Science and Technology* 58(4), 2042-2049. <https://doi.org/10.1111/ijfs.15756>
- Plakantonaki, S., Roussis, I., Bilalis, D., Priniotakis, G., (2023). Dietary Fiber from Plant-Based Food Wastes: A Comprehensive Approach to Cereal, Fruit, and Vegetable Waste Valorization, *Processes*, p. 1580. <https://doi.org/10.3390/pr11051580>
- Prakash, P., Kaur, R., Shekhar, S., Prasad, K., (2024). Technological and Analytical Aspects of Bioactive Compounds and Nutraceuticals from Plant (Vegetable) Sources, in: Charanjit S. Riar, P.S.P. (Ed.), *Bioactive Compounds and Nutraceuticals from Plant Sources*. Apple Academic Press, , pp. 3-41. ISBN: 9781003455172.
<https://doi.org/10.1201/9781003455172-2>
- Prakash, P., Shekhar, S., Prasad, K., (2023). Characterisation of *Allium sativum* bulb and its component for high end applications. *Journal of Physics: Conference Series* 2663(1), 012023.
<https://doi.org/10.1088/1742-6596/2663/1/012023>
- Prasad, K., Gadhave, R.K., Kaur, R., Divyanshi, Das, R., Shekhar, S., (2022). Technological, Processing and Nutritional Aspects of Banana and Plantain: A Review. *Food Science & Nutrition Technology* 7(2), 284. <https://doi.org/10.23880/fsnt-16000284>
- Procino, E., Marinaccio, L., Gentile, G., Cichelli, A., Mollica, A., Stefanucci, A., (2026). The importance of dietary fibers from cereal bran in daily diet. *Applied Food Research* 6(1), 101795.
<https://doi.org/https://doi.org/10.1016/j.afres.2026.101795>
- Ramirez, C.S.V., Temelli, F., Saldaña, M.D.A., (2021). Production of pea hull soluble fiber-derived oligosaccharides using subcritical

- water with carboxylic acids. *The Journal of Supercritical Fluids* 178, 105349.
<https://doi.org/https://doi.org/10.1016/j.supflu.2021.105349>
- Saini, P., Islam, M., Das, R., Shekhar, S., Sinha, A.S.K., Prasad, K., (2023). Wheat Bran as Potential Source of Dietary Fiber: Prospects and Challenges. *Journal of Food Composition and Analysis* 116, 105030. <https://doi.org/10.1016/j.jfca.2022.105030>
- Sakdasri, W., Arnutpongchai, P., Phonsavat, S., Bumrunghthaichaichan, E., Sawangkeaw, R., (2022). Pressurized hot water extraction of crude polysaccharides, β -glucan, and phenolic compounds from dried gray oyster mushroom. *LWT* 168, 113895.
<https://doi.org/https://doi.org/10.1016/j.lwt.2022.113895>
- Schmidt, M., Wiege, B., Hollmann, J., (2021). Comparison of Alkaline/Oxidative and Hydrothermal Extraction of Wheat Bran Arabinoxylans, *Foods*, p. 826.
<https://doi.org/10.3390/foods10040826>
- Shekhar, S., Prakash, P., Singha, P., Prasad, K., Singh, S., (2023). Modeling and Optimization of Ultrasound-Assisted Extraction of Bioactive Compounds from *Allium sativum* Leaves Using Response Surface Methodology and Artificial Neural Network Coupled with Genetic Algorithm. *Foods* 12(9), 1925.
<https://doi.org/10.3390/foods12091925>
- Shen, M., Ge, Y., Kang, Z., Quan, Z., Wang, J., Xiao, J., Wang, W., Cao, L., (2019). Yield and Physicochemical Properties of Soluble Dietary Fiber Extracted from Untreated and Steam Explosion-Treated Black Soybean Hull. *Journal of Chemistry* 2019(1), 9736479.
<https://doi.org/https://doi.org/10.1155/2019/9736479>
- Strkalj, L., Yakubov, G.E., Burton, R.A., Cowley, J.M., (2025). Structural and Functional Properties of Fiber From Psyllium (*Plantago ovata*) Husk: Current Knowledge and Strategies to Expand Its Application in Food and Beyond. *Comprehensive Reviews in Food Science and Food Safety* 24(5), e70297.
<https://doi.org/https://doi.org/10.1111/1541-4337.70297>
- Su, L.-l., Li, X., Guo, Z.-j., Xiao, X.-y., Chen, P., Zhang, J.-b., Mao, C.-q., Ji, D., Mao, J., Gao, B., Lu, T.-l., (2023). Effects of different

- steaming times on the composition, structure and immune activity of Polygonatum Polysaccharide. *Journal of Ethnopharmacology* 310, 116351. <https://doi.org/https://doi.org/10.1016/j.jep.2023.116351>
- Suleiman, J., Shamsudin, R., Hamzah, M.H., Basri, M.S.M., Jimoh, K.A., (2025). Extraction optimization and characterization of durian (*Durio zibethinus*) rind pectin extracted by subcritical water. *Food Chemistry* 474, 143123. <https://doi.org/https://doi.org/10.1016/j.foodchem.2025.143123>
- Takeyama, E., Fukushima, M., Tanimura, A., (2002). Effect of Heat-Treatment on the Content and Polysaccharide Composition of Dietary Fiber. *Food Science and Technology Research* 8(2), 125-130. <https://doi.org/https://doi.org/10.3136/fstr.8.125>
- Tanaka, M., Takamizu, A., Hoshino, M., Sasaki, M., Goto, M., (2012). Extraction of dietary fiber from Citrus junos peel with subcritical water. *Food and Bioproducts Processing* 90(2), 180-186. <https://doi.org/https://doi.org/10.1016/j.fbp.2011.03.005>
- Thakur, R., Sharma, H.K., (2026a). Effect of different techniques on pumpkin seed hull (PSH) dietary fiber extraction: Yield, monosaccharide composition, structural, functional, and physiological properties. *Bioresource Technology Reports* 35, 102864. <https://doi.org/https://doi.org/10.1016/j.biteb.2026.102864>
- Thakur, R., Sharma, H.K., (2026b). Microwave and alkali-extracted dietary fiber from pumpkin seed hulls: Monosaccharide composition, structural, thermal, functional, and physiological properties. *Journal of Food Measurement and Characterization*. <https://doi.org/https://doi.org/10.1007/s11694-026-04818-5>
- Thakur, R., Sharma, H.K., (2026c). Profiling of Dietary Fiber From Pumpkin (*Cucurbita moschata*) Seed Hulls Pertaining to Monosaccharide Composition, Structural, Thermal, and Functional Properties. *Food Chemistry International* n/a(n/a). <https://doi.org/https://doi.org/10.1002/fci2.70092>
- Thiruvankadam, S., Izhar, S., Yoshida, H., Danquah, M.K., Harun, R., (2015). Process application of Subcritical Water Extraction (SWE) for algal bio-products and biofuels production. *Applied Energy* 154,

- 815-828.
<https://doi.org/https://doi.org/10.1016/j.apenergy.2015.05.076>
- Ti, Y., Wang, W., Wang, X., Ban, Y., Wang, P., Zhang, Y., Song, Z., (2022). Pumpkin Polysaccharide Extracted by Subcritical Water: Physicochemical Characterization and Anti-Diabetic Effects in T2DM Rats. *Molecular Nutrition & Food Research* 66(24), 2200160. <https://doi.org/https://doi.org/10.1002/mnfr.202200160>
- Tian, X.-Y., Liu, J.-F., Qiao, C.-C., Cheng, Z., Wu, N.-N., Tan, B., (2024). Functional properties and structure of soluble dietary fiber obtained from rice bran with steam explosion treatment. *Journal of Cereal Science* 118, 103938.
<https://doi.org/https://doi.org/10.1016/j.jcs.2024.103938>
- USDA, U.S.D.G.A.C., (2010). Dietary guidelines for Americans, 2010. U.S. Department of Health and Human Services; U.S. Department of Agriculture.
- Vaz, A.A., Odriozola-Serrano, I., Oms-Oliu, G., Martín-Belloso, O., Bellí, G., (2025). Exploring the prebiotic potential of dietary fibre concentrates from artichoke, red pepper, cucumber, and carrot by-products. *Food Hydrocolloids for Health* 8, 100257.
<https://doi.org/https://doi.org/10.1016/j.fhfh.2025.100257>
- von Muhlenbrock, C., Aronsohn, F., Quera, R., Madrid, A.M., (2025). The role of dietary fiber in the gastrointestinal tract: when, how and why? *Best Practice & Research Clinical Gastroenterology* 79, 102080. <https://doi.org/https://doi.org/10.1016/j.bpg.2025.102080>
- Wang, L., Xu, H., Yuan, F., Fan, R., Gao, Y., (2015). Preparation and physicochemical properties of soluble dietary fiber from orange peel assisted by steam explosion and dilute acid soaking. *Food Chemistry* 185, 90-98.
<https://doi.org/https://doi.org/10.1016/j.foodchem.2015.03.112>
- Wang, S., Fang, Y., Xu, Y., Zhu, B., Piao, J., Zhu, L., Yao, L., Liu, K., Wang, S., Zhang, Q., Qin, L., Wu, J., (2022). The effects of different extraction methods on physicochemical, functional and physiological properties of soluble and insoluble dietary fiber from *Rubus chingii* Hu. fruits. *Journal of Functional Foods* 93, 105081.
<https://doi.org/https://doi.org/10.1016/j.jff.2022.105081>

- Wang, T., Liang, X., Ran, J., Sun, J., Jiao, Z., Mo, H., (2017). Response surface methodology for optimisation of soluble dietary fibre extraction from sweet potato residue modified by steam explosion. *International Journal of Food Science and Technology* 52(3), 741-747. <https://doi.org/10.1111/ijfs.13329>
- Wu, W., Huang, N., Huang, J., Wang, L., Wu, L., Wang, Q., Zhao, H., (2022). Effects of the steaming process on the structural properties and immunological activities of polysaccharides from *Polygonatum cyrtoneura*. *Journal of Functional Foods* 88, 104866. <https://doi.org/https://doi.org/10.1016/j.jff.2021.104866>
- Xi, H., Wang, A., Qin, W., Nie, M., Chen, Z., He, Y., Wang, L., Liu, L., Huang, Y., Wang, F., Tong, L.-T., (2023). The structural and functional properties of dietary fibre extracts obtained from highland barley bran through different steam explosion-assisted treatments. *Food Chemistry* 406, 135025. <https://doi.org/https://doi.org/10.1016/j.foodchem.2022.135025>
- Yan, J.-K., Wu, L.-X., Cai, W.-D., Xiao, G.-S., Duan, Y., Zhang, H., (2019). Subcritical water extraction-based methods affect the physicochemical and functional properties of soluble dietary fibers from wheat bran. *Food Chemistry* 298, 124987. <https://doi.org/https://doi.org/10.1016/j.foodchem.2019.124987>
- Yang, K., Yang, Z., Wu, W., Gao, H., Zhou, C., Sun, P., Wu, C., Xia, Q., Chen, J., (2020). Physicochemical properties improvement and structural changes of bamboo shoots (*Phyllostachys praecox* f. *Prevernalis*) dietary fiber modified by subcritical water and high pressure homogenization: a comparative study. *Journal of Food Science and Technology* 57(10), 3659-3666. <https://doi.org/10.1007/s13197-020-04398-2>
- Yang, L., Zhu, R., Zhang, N., Zhao, W., Wang, C., (2024). Effects of Different Extraction Methods on the Structural and Functional Properties of Soluble Dietary Fibre from Sweet Potatoes, *Foods*, p. 2395. <https://doi.org/10.3390/foods13152395>
- Yoo, H.-U., Ko, M.-J., Chung, M.-S., (2020). Hydrolysis of beta-glucan in oat flour during subcritical-water extraction. *Food Chemistry* 308, 125670. <https://doi.org/https://doi.org/10.1016/j.foodchem.2019.125670>

- Zadeike, D., Vaitkeviciene, R., Degutyte, R., Bendoraitiene, J., Rukuiziene, Z., Cernauskas, D., Svazas, M., Juodeikiene, G., (2022). A comparative study on the structural and functional properties of water-soluble and alkali-soluble dietary fibres from rice bran after hot-water, ultrasound, hydrolysis by cellulase, and combined pre-treatments. *International Journal of Food Science and Technology* 57(2), 1137-1149. <https://doi.org/10.1111/ijfs.15480>
- Zhang, M., Liu, Y., Liu, J., Zheng, T., Li, Y., He, S., Jiang, M., Wu, L., Wang, S., (2024). Extraction methods of dietary fiber and effect on bioactivity: A review. *Process Biochemistry* 146, 451-461. <https://doi.org/https://doi.org/10.1016/j.procbio.2024.09.017>
- Zhao, L., Zhao, X., Yang, G., Liu, T., Guo, Q., Zhao, M., Zhao, Q., (2024). Physicochemical and emulsification properties of okara-derived soluble dietary fiber modified by steam explosion. *Food Hydrocolloids* 152, 109943. <https://doi.org/https://doi.org/10.1016/j.foodhyd.2024.109943>
- Zheng, H., Sun, Y., Zheng, T., Zeng, Y., Fu, L., Zhou, T., Jia, F., Xu, Y., He, K., Yang, Y., (2023). Effects of shear emulsifying/ball milling/autoclave modification on structure, physicochemical properties, phenolic compounds, and antioxidant capacity of lotus (*Nelumbo*) leaves dietary fiber. *Frontiers in Nutrition* 10, 1064662.
- Zhong, J., Xie, H., Wang, Y., Xiong, H., Zhao, Q., (2024). Nanofibrillated cellulose derived from rice bran, wheat bran, okara as novel dietary fibers: Structural, physicochemical, and functional properties. *International Journal of Biological Macromolecules* 273, 132902. <https://doi.org/https://doi.org/10.1016/j.ijbiomac.2024.132902>
- Zhu, S., Yan, M., Feng, Y., Yin, J., Jiang, S., Guan, Y., Gao, B., (2024). Extraction of Soluble Dietary Fiber from Sunflower Receptacles (*Helianthus annuus* L.) and Its Alleviating Effect on Constipation in Mice, *Nutrients*, p. 3650. <https://doi.org/10.3390/nu16213650>

SUSTAINABLE FOOD INNOVATIONS:

PRODUCT DEVELOPMENT, PACKAGING, AND WASTE VALORIZATION

Innovations in Sustainable Food Processing, Functional Foods and Smart Technologies

This book presents recent research and innovative applications in sustainable food product development, packaging and waste valorization. It explores the utilization of biodegradable crops, food processing by-products and agricultural residues, development of functional and specialized food products, sustainable packaging materials, and emerging processing technologies. The chapters highlight multidisciplinary approaches integrating food science, food engineering, nutrition, biotechnology and materials science for resource-efficient, environmentally sustainable and value-added food systems. The volume serves as a useful reference for researchers, academics, students, industry professionals and Policymakers working towards innovations in sustainable food processing, functional foods and smart technologies.

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ISBN: 978-81-990304-3-5



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