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# A Comprehensive Review of the Extraction of Dietary Fibres from Plant-based Industrial Waste

**Ivana Sahoon***

*Department of Food Technology, University of Osijek, Osijek, Croatia*

## Abstract

Dietary fibers are essential components of a healthy diet, known for their various health benefits such as improving digestion, regulating blood sugar levels and supporting weight management. These fibers are commonly found in plant-based foods, including fruits, vegetables, whole grains and legumes. However, as industrial processes in the food and agriculture sector generate substantial amounts of plant-based waste, researchers and industries are exploring innovative methods to extract dietary fibers from this waste. This comprehensive review delves into the extraction of dietary fibers from plant-based industrial waste, examining various techniques, challenges and potential applications.

**Keywords:** Dietary fibres • Hemicellulases • Animal health

## Introduction

Techniques like sieving and centrifugation can further separate fibers based on particle size and density Chemical methods involve the use of chemicals to dissolve or break down the components of the waste, leaving behind the dietary fibers. Acid and alkali treatments are commonly used in this category. Alkaline treatments, such as the use of sodium hydroxide, can selectively dissolve lignin and hemicellulose, leaving cellulose-rich fibers. Enzymatic methods utilize enzymes to break down complex carbohydrates and facilitate the extraction of fibers. Enzymes like cellulases and hemicellulases target specific components of the waste matrix, effectively releasing fibers [1].

## Literature Review

Plant-based waste can originate from various sources, leading to variations in composition. Factors such as plant species, growth conditions and industrial processes can impact the type and quantity of fibers present. This variability poses challenges in standardizing extraction methods. Effective extraction requires the separation of fibers from other components like proteins, lipids and minerals. Achieving high purity while retaining the beneficial properties of fibers is complex and demands precise processing techniques. While seeking to utilize waste materials, it is crucial to maintain environmentally friendly extraction methods. Chemical processes, if not managed properly, can lead to waste disposal issues and environmental pollution. Enzyme-assisted methods are a step towards reducing the ecological footprint of extraction [2].

## Discussion

The cost-effectiveness of extraction methods is a significant consideration. High extraction costs can hinder the commercial viability of utilizing waste for fiber extraction. Researchers and industries must work on optimizing processes to ensure economic feasibilityThe extraction of dietary fibers from plant-based industrial waste opens up a range of potential applications across various industries. One of the primary applications is in the food industry, where extracted fibers can be incorporated into various products. These include baked goods, breakfast cereals, snacks and beverages, enhancing their nutritional content and fiber profile. The fibers can also act as natural thickeners and stabilizers in food formulations. Dietary fiber supplements are gaining popularity due to their health benefits. Extracted fibers can be processed into convenient forms such as powders, capsules, or tablets, making them accessible for individuals aiming to increase their fiber intake. The agricultural sector can benefit from utilizing extracted fibers as feed additives for livestock. These fibers can improve digestion and nutrient absorption in animals, contributing to overall animal health [3].

Physical methods involve mechanical processes to separate fibers from other components of the waste. One of the most common methods is milling or grinding, where the waste material is broken down into smaller particles, facilitating the separation of fibers. Enzyme-assisted extraction is considered more environmentally friendly and milder compared to chemical methods. While the extraction of dietary fibers from plant-based industrial waste holds immense promise, several challenges must be addressed to ensure efficient and sustainable processes. Several extraction techniques have been developed to obtain dietary fibers from plant-based industrial waste. These methods can be broadly categorized into physical, chemical and enzymatic techniques. Fibers obtained from waste can be utilized in the production of biodegradable materials. These materials have applications in packaging, reducing the environmental impact of single-use plastics. Plant-based waste contains organic components that can be used for bioenergy production through processes like anaerobic digestion or fermentation [4-6].

## Conclusion

The residual fiber can still be extracted after energy recovery. The extraction of dietary fibers from plant-based industrial waste presents a compelling avenue for addressing both environmental and nutritional challenges. With various extraction techniques available, researchers and industries have the opportunity to contribute to sustainable practices while providing valuable dietary components. As advancements continue in this field, the optimization of extraction processes, consideration of environmental impacts and exploration of novel applications will collectively shape the future of dietary fiber extraction from plant-based waste.

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## Conflict of Interest

There is no conflict of interest by author.

***Address for Correspondence:** Ivana Sahoon, Department of Food Technology, University of Osijek, Osijek, Croatia; E-mail: sahoon0@gmail.com*



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