**Title**

**Untapping the Potential of Sorghum Arabinoxylan as a Sustainable Biomaterial for Next-Generation Applications**


**Presenting Author**

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**Abstract**

Sustainable biomaterials are not about uncovering novel resources but about revealing the hidden potential of underutilized compounds found in nature. Millets, such as sorghum, pearl millet, finger millet, foxtail millet, and other small millets, are climate-resilient crops that require fewer inputs and prosper under challenging environmental conditions. Arabinoxylan (Ax) is one of the most abundant and significant cell-wall polysaccharides, possessing enormous potential for food, pharmaceutical, and biomedical applications. This presentation highlights the untapped potential of sorghum arabinoxylan as a sustainable biomaterial for next-generation applications. Arabinoxylan is a renewable, biodegradable, biocompatible, and multifunctional biopolymer with

excellent water-holding, film-forming, antioxidant, prebiotic, mucoadhesive, and immunomodulatory properties. However, the successful utilization of arabinoxylan depends largely on efficient extraction technologies that maximize recovery while preserving its structural and functional integrity.

As a model system, sorghum arabinoxylan was extracted using autoclave-assisted, enzymatic-assisted alkaline, and ultrasound-assisted extraction techniques. Comparative evaluation of yield, functional properties, antioxidant activity, and structural characteristics demonstrated that ultrasound-assisted extraction is an efficient green technology for obtaining functional arabinoxylan with enhanced application. The long-term vision of this research is to explore underutilized biomolecules from diverse millet species and transform them into high-value, sustainable products for food, packaging, pharmaceutical, drug-delivery, and biomedical applications. By promoting complete utilization of millet resources and reducing dependence on petroleum-based materials, this work contributes to a circular bioeconomy and aligns with SDG 3 (Good Health and Well-Being), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). Ultimately, millet-derived arabinoxylans can serve as next-generation sustainable biomaterials that bridge agriculture, health, and advanced materials innovation.

**Biography**

**Dr. Narayanasamy Sangeetha** is a **Professor** in the Department of Food Science and Technology, School of Life Sciences, Pondicherry University, India. She has over 17 years of experience in teaching, research, and academic mentoring. Her research focuses on **millet science and technology, food product development, functional foods, community nutrition, and sustainable food systems**. She has made significant contributions to the valorization of underutilized millets through innovative processing technologies and the development of value-added food products. Her current research emphasizes sustainable biomaterials, millet-derived functional ingredients, and their applications in food, pharmaceutical, and biomedical sectors. She has successfully guided numerous postgraduate and doctoral scholars, published extensively in reputed international journals, and actively collaborates with farming communities to promote sustainable agriculture and food security. Her work bridges scientific innovation with societal impact, supporting the advancement of climate-resilient food systems and circular bioeconomy initiatives aligned with the Sustainable Development Goals (SDGs).