National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Design and Development of an Electrohydrodynamic (EHD) Drying System for Process Optimization and Valorization of Whole Nutmeg (Myristica fragrans Houtt.) Fruit
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Venue	: CH-113 Department of Food Process Engineering
Date and Time	: 16 Jul 2025 (05.00 PM)
Abstract	: The preservation and valorisation of spices through drying techniques are essential for enhancing shelf life, maintaining quality attributes, and achieving sustainability in spice processing. Nutmeg (Myristica fragrans Houtt.), a highly valuable spice, is traditionally dried through thermal methods, which are energy-intensive and raise environmental concerns, as well as lead to the degradation of important bioactive and volatile compounds. Electrohydrodynamic drying represents a novel nonthermal drying technology that enables effective moisture removal at ambient temperatures, thereby maintaining the quality, safety, functional, and nutritional attributes of food products. However, its application in the drying and valorisation of whole nutmeg has not been extensively investigated. The present research aims to design, develop, and optimise the EHD drying process for whole nutmeg (pericarp, mace, and seed). The study systematically investigates the effects of design parameters and process variables, including the electrode geometry, electrode gap, and electrical field strength, on the physical, chemical, phytochemical, and thermal properties of the nutmeg. Additionally, this research explores the efficiency of EHD drying on the inactivation of spoilage microorganisms and enzymes to enhance shelf life and industrial value and meet national and international quality standards. The comparative assessments involving freeze drying, oven drying, and microwave drying methods will be conducted to analyse the drying quality, energy efficiency, and cost effectiveness. Additionally, the shelf life of optimally dried nutmeg under commercial packaging and storage conditions will be comprehensively evaluated. This study addresses significant knowledge gaps, proposing a sustainable and efficient alternative to traditional drying techniques, thereby fostering the commercial valorisation of nutmeg. Keywords: Electrohydrodynamic drying, Nutmeg, Nonthermal drying, Process optimisation, Valorization, Shelflife, Microbial inactivation.