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Progress Seminar

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Seminar Title : Exploring the Potential of Himalayan Bean Proteins: Extraction, Modification, and Application in Meat Analogues  
 Speaker : Debojit Baidya Choudhury ( Rollno : 522fp1003)  
 Supervisor : Mohd Khalid Gul  
 Venue : FP - CH113  
 Date and Time : 15 Jul 2025 (11:00 AM)  
 Abstract :

The increasing consumer demand for ethical, sustainable, and nutritionally balanced foods has catalyzed a significant transformation across the food industry, fostering the development of innovative plant-based alternatives. Among the promising candidates, bean proteins sourced from the Himalayan region have garnered attention as viable substitutes for animal- and cereal-based proteins in various food applications. These proteins are not only abundant and economically accessible but also exhibit low allergenic potential and high consumer acceptability, with crude protein contents ranging between 20–32%. Alkaline extraction remains a widely adopted method for isolating plant proteins, attributed to its operational simplicity and cost-effectiveness. In this study, extraction parameters for Himalayan bean proteins were optimized using response surface methodology. The optimal conditions identified were an extraction pH of 10.0, temperature of 44 °C, extraction time of 116 min, and a solvent-to-solute ratio of 14.24 mL/g. While effective in maximizing yield, high alkaline pH conditions may compromise protein quality by altering amino acid composition, structural flexibility, and techno-functional attributes. To address these challenges, the extracted bean proteins were subjected to amyloid fibrillation, a supramolecular assembly process known to enhance structural rigidity and functionality. This modification led to significant improvements in rheological and techno-functional properties such as solubility, emulsification, and gelation capacity. However, the process also resulted in the partial loss of certain nutritional and functional characteristics. To overcome these limitations, chemical glycation via the Maillard reaction is proposed as a subsequent modification strategy. Glycation can potentially enhance nutritional value and restore functional performance by improving protein stability, water-binding capacity, and digestibility. The resulting native, fibrillated, and glycated bean proteins will be evaluated for application in the formulation of meat analogues, thereby contributing to the development of sustainable, high-protein, plant-based food systems.