Advances in Food Process Engineering

Dr. Gazia Nasir

Assistant Professor, Department of Bioengineering, Integral University, Lucknow, India

Dr. Alvina Farooqui

Professor and Head, Department of Bioengineering, Integral University, Lucknow, India

Dr. Nida Fatima

Additional Pro Chancellor, Integral University, Lucknow, India

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PREFACE

Food Process Engineering has witnessed remarkable transformations in recent decades, driven by the urgent need for sustainable technologies, effective waste valorization, and the growing consumer demand for natural, safe, and functional food products. The book “Advances in Food Process Engineering” is a compilation of recent innovations, emerging techniques, and interdisciplinary research in the domain, particularly focusing on bio-based materials, novel extraction techniques, and food preservation strategies.

This volume brings together eight carefully selected chapters that reflect the dynamic evolution of food process engineering. Each chapter is grounded in experimental work and offers insights into practical applications that contribute to enhanced food quality, safety, sustainability, and nutritional functionality. From the application of sodium alginate and kadam leaf extract coatings to extend the shelf life of cape gooseberry, to microwave-assisted protein extraction from mustard meal, the book explores cutting-edge research and development across diverse food matrices.

In particular, this book emphasizes the utilization of agro-industrial by-products, such as lemon waste, pineapple peel, coconut shell, and mustard meal, highlighting their potential to be transformed into valuable food additives, packaging materials, and bioactive compounds. It also introduces readers to eco-leather as a secondary packaging material, biodegradable films, and microencapsulation techniques, reflecting the growing trend toward green technologies and circular economy principles in food systems.

The intended audience includes food scientists, process engineers, researchers, graduate students, and industry professionals who are interested in sustainable innovation and novel applications in food processing. We hope this compilation will serve as both a reference and inspiration for ongoing research and industrial applications.

We extend our heartfelt gratitude to the contributing authors for their valuable research and to all those who supported the creation of this volume. It is our sincere belief that this book will contribute meaningfully to the growing body of knowledge in food process engineering and foster new ideas for future innovations.

CONTENTS

Chapter – 1

The Application of Sodium Alginate and Aqueous Extract of Kadam (Neolamarckia Cadamba) Leaf Coating to Extend the Shelf Life of Cape Gooseberry

Zayeema Anjum[1], Khwaja Osama[1*], Kaiser Younis[2]**

[1]Department of Bioengineering, Faculty of Engineering & Information Technology, Integral university, Lucknow

[2]Department of Food Technology, Islamic University of Science and Technology, Awantipora-192122

[,**]corresponding author*

Abstract

Cape gooseberries, a prominent exotic fruit, encounters challenges related to physiochemical and microbial deterioration during transportation and storage, resulting in post-harvest losses. To overcome this issue, alternative preservation methods have been developed, including the use of edible coating made from biopolymers enriched with pectin. This experiment aimed to utilize Sodium alginate (SA) combined with Kadam Leaf Extract (KLE) to create an edible SC for cape gooseberries, and to assess its impact on prolonging shelf life. Cape gooseberries tend to deteriorate over time, indicated by factors such as WL, hardness loss, pH, colour, TA, TSS, spoilage percentage, maturity index and microbial growth. For this study, cape gooseberries were divided into five groups, each consisting of thirty cape gooseberry fruits. All the samples were kept at ambient temperature (25 °C). During the 30 days storage period, all samples experienced significant increase ($p < 0.05$) in weight loss percentage, pH, TSS, MI, spoilage percentage, and microbial growth, the increase was prominently more significant in the control samples. The significant decrease ($p < 0.05$) in hardness and TA was