Development of Functional Herbal Tea Cubes as a Novel Instant Infusion System with Enhanced Bioactive Stability and Consumer Acceptability

1. Introduction and Background

In recent years, there has been a global rise in the demand for functional foods and beverages that not only provide nourishment but also contribute to overall wellness. Herbal teas, enriched with phytochemicals and antioxidants, are widely recognized for their health benefits. However, conventional forms such as loose leaves, powders, or tea bags often face limitations, including loss of bioactive compounds during processing and storage, lack of convenience, and reduced consumer appeal.

Developing a functional herbal tea cube offers a novel solution by combining convenience, stability of bioactive compounds, and enhanced sensory attributes. Unlike traditional preparations, herbal tea cubes can preserve the nutritional and therapeutic potential of medicinal plants while providing consumers with a modern, easy-to-use product. This research is positioned at the intersection of food technology, functional nutrition, and consumer science, aiming to deliver a sustainable and innovative beverage format aligned with the growing wellness market.

2. Research Objectives

The proposed study seeks to:

- ✓ Formulate herbal tea cubes using selected medicinal and aromatic herbs with natural binders and stabilizers.
- ✓ Evaluate the stability of bioactive compounds (e.g., polyphenols, flavonoids, antioxidants) during processing and storage.
- ✓ Analyze infusion performance in terms of solubility, phytochemical retention, and antioxidant activity.
- ✓ Conduct sensory evaluation to assess consumer acceptability, focusing on taste, aroma, texture, and convenience.
- ✓ Optimize formulation for maximum bioactive retention, consumer satisfaction, and commercial viability.

3. Methodology

Herbal extracts from selected medicinal plants will be prepared and converted into powder using the spray drying technique with suitable natural carriers and stabilisers to preserve bioactive compounds. The spray-dried powders will then be compressed into functional tea cubes optimized for solubility and infusion efficiency. Physicochemical analysis, bioactive retention (polyphenols, flavonoids, antioxidants), and antioxidant activity will be evaluated using standard assays. Sensory evaluation and consumer testing will determine acceptability, while storage studies will assess stability and safety.

4. Expected Outcomes

- ✓ Development of herbal tea cubes using spray-dried extracts with superior infusion.
- ✓ Enhanced stability of phytochemicals and antioxidants via spray drying.
- ✓ Data on bioactive retention during processing and storage.
- ✓ Consumer insights on sensory appeal and market potential.
- ✓ Contribution to sustainable functional beverages through advanced drying technology.

5. Significance of the Research

This study merges traditional herbal knowledge with spray drying technology to create a convenient, health-oriented beverage. It meets the rising demand for wellness products while offering a sustainable alternative to tea bags and synthetic drinks. The work supports the functional food industry with a commercially viable product and contributes academic insights in food science and nutrition. Overall, it bridges the gap between bioactive functionality and consumer-friendly design, benefiting both industry and society.