

TECH OFFER

Scalable Technology Converting Fruit By-products to Functional Food Ingredients



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Food Security

Sustainability - Circular Economy

Waste Management & Recycling - Food & Agriculture

Waste Management

TECHNOLOGY READINESS LEVEL (TRL): **TRL4**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174932**

OVERVIEW

Singapore has a high consumption of fruits and vegetables, both locally produced and imported, and a significant portion of the total waste generated is derived from fruits and vegetables. These fruits and vegetables contain untapped nutritional and functional properties that can be upcycled into higher value products. This institute of higher learning has developed a technology with the know-how to cultivate microorganisms and a series of zero-waste extraction and purification methods to maximize the value of fruit peels into functional food ingredients.

This technology is designed for three types of industry players: i) fruit vending/processing industry with abundance of good quality fruit by-products; ii) waste management industry with technologies to value add to the by-products; and iii) start-ups with keen interest to upcycle by-products into novel food ingredients.

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TECHNOLOGY FEATURES & SPECIFICATIONS

The technology is a sustainable process and here are some key features:

1. Zero waste solution – achieving circular economy
2. Low-carbon economy, reduced waste during manufacturing
3. Easy to assemble using off-the-shelf commercial-ready equipment
4. Low CAPEX, modular installation
5. Simple method – any technician with basic training and carry out the process
6. Scalable – abundance of fruit by-products to achieve economies of scale

A reactor for pilot scale testing at a reasonable cost has been fabricated for collaborators to tap on.

POTENTIAL APPLICATIONS

- Food-grade microbial protein: A protein-rich source of food ingredient with functional properties to be applied into beverages, confectionery, plant-based meats
- Pectin from fruit peels: A finished product upon extraction process, it is rich in soluble dietary fiber that can be used as natural thickener or in jam/sauces and beverages.
- Cleaning agents: Antimicrobial properties were observed in the fruit peels post extraction

UNIQUE VALUE PROPOSITION

Good quality fruit by-products from fruit industry are valuable resources for upcycling. These materials are currently disposed by incineration. With the high moisture content of fruit peels, incineration is energy-intensive leading to higher CO₂ emission. This technology produces valuable food ingredients such as protein and dietary fiber, contributing to both food security and circular economy.