# The Specialty

The first fermented beverage in Malaysia that have been successfully developed by MARDI using ceri Terengganu.

The product is created as a single “nutrient-packed functional beverage” that would be combined the multiple health benefits from high antioxidants, organic acids, prebiotic, antimicrobial and biofunctional properties.

There are no added preservatives, colouring, flavouring and sweeteners.

Final product is ultra-filtered to guarantee sparkling clarity free live microorganisms.

In-vivo studies showed that fermented ceri Terengganu beverage had no toxic effect. Additionally, fermented ceri Terengganu beverage could be used as part of a therapeutic regimen to positively influence hypercholesterolemic via its lipid-lowering properties. Based on recent animal studies.

Fermented ceri Terengganu beverage managed to reduce the blood total cholesterol (TC-C) and low-density lipoprotein cholesterol (LDL-C) levels by 33.73% and 65.56%, compared to simvastatin (commercial lipid-lowering medication) 28.66% and 58.94%, respectively.

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Nutrima® by MARDI

# FERMENTED

## CERI TERENGGANU BEVERAGE

*a fermented beverage for wellness*


KEMENTERIAN PERTANIAN DAN INDUSTRI MAKANAN

INSTITUT PENYELIDIKAN DAN KEMAJUAN PERTANIAN MALAYSIA • MARDI

# Microbial Fermentation Powered Solutions for Beverage Innovations

The concept of health-promoting foods is not new: 2400 years ago, Hippocrates said: “Let food be thy medicine and medicine be thy food”. Consumer demand for “healthy” food and beverages is considered as a driving force behind the growth of the functional foods sector. The production and consumption of functional products have substantially increased because of the health benefits they provide beyond their basic nutritional functions. It has been suggested that microbial fermentation can influence the bio-accessibility and bioavailability of compounds in substrates. Thus, Malaysian Agricultural Research and Development Institute (MARDI) has ventured into diversifying the application of microbial fermentation as a biotechnological solution to enrich the profile of the biogenic compounds of ceri Terengganu juice with a consortium of kombucha strains.

**Ceri Terengganu - *Lepisanthes fruticosa (Roxb) Leenh***

*Lepisanthes fruticosa* (Roxb) Leenh or locally known as ceri Terengganu is a non-seasonal under-utilised fruit species that produces fruit throughout the year. The fruit tree is shady with a height of 4–10m and has small buttresses. The ceri Terengganu fruit is round but sharp at one end, measuring 2 cm. The skin resembles that of a cherry and is smooth, shiny, bright red when young and dark red when ripe. The fruit tastes bitter when young and sweet when ripe. Based on the ethnobotanical studies, ceri Terengganu is usually consumed as a food source and also used in traditional medicine by rural folks. Currently, there is no industry specialising in ceri Terengganu processing in Malaysia, so the fruit remains under-utilised by the general population. With proper product development, the potential of this indigenous ceri Terengganu as a cultivated crop may be reached. The economic returns from innovative fermented ceri Terengganu -based products can offer improved opportunities for all members in the supply chain: from raw material producers and processors to retailers.

# Innovating Value-added Products Through Microbial Fermentation

- In this project, microbial fermentation with a consortium of kombucha strains has been proposed as a biotechnological solution to enrich the profile of the biogenic compounds in ceri Terengganu juice.
- The consortium of kombucha strains includes multiple safe microorganisms. These microorganisms include yeast *(Saccharomyces cerevisiae)*, *Lactobacillus plantarum* and a group of acetic acid bacteria, such as *Acetobacter* spp. and *Glucanobacter* spp. live together symbiotically to convert the juice to form new fermented products.
- The fermentation of ceri Terengganu started with dilution of ceri Terengganu juice to a final 2.1 – 2.2% Brix value. This was followed by adding 15% of sugar to the juice, and pasteurisation at 90°C for 10 minutes. The medium was then inoculated with 10% of the culture containing a consortium of kombucha strains. The juice at the initial pH of 5.25 was then incubated at 28°C for 21 days, under static aerobic conditions until achieved 0.9–1.0% total acidity and final pH 3.25. Finally, the fermented ceri Terengganu juice was filtered using an ultrafilter (0.22 µm) to obtain a final product free of microorganisms.
- Through microbial fermentation, more active metabolites will be produced to enhance the nutritional value of the original ceri Terengganu juice.
- This favourable fermentable property of the ceri Terengganu juice can also be explored for other fermented products with functional properties. Consequently, it is desirable to process fresh ceri Terengganu into a fermented beverage to avoid waste and to increase its marketability.