

**P**alm-based sophorolipid biosurfactant production is a two-stage bioprocess where sophorolipids are mainly produced after a first stage of growth, ending because of nitrogen limitation. We report here a pilot scale production of palm-based sophorolipid biosurfactant which we believe would be a promising starting point for the expansion of biotechnology applications of palm oil via production of a high value added bio-based surfactant namely sophorolipid.

## BACKGROUND

The economic production of biosurfactants lies in the choice of the raw material and the process. Obviously, biosurfactants can compete most effectively with their synthetic counterparts when their cost of production reaches parity or less. This is the key to their large scale application in the industry.

## PROBLEM STATEMENT

Sophorolipid biosurfactants are widely used in personal care and nutraceutical products. However, no technology has been reported on the large scale production of this industrially important and emerging sophorolipids based on refined, bleached and deodorised (RBD) palm olein. Therefore, this technology is focused at producing palm-based sophorolipid (optimised at lab scale) at large scale fermentation.

## THE TECHNOLOGY

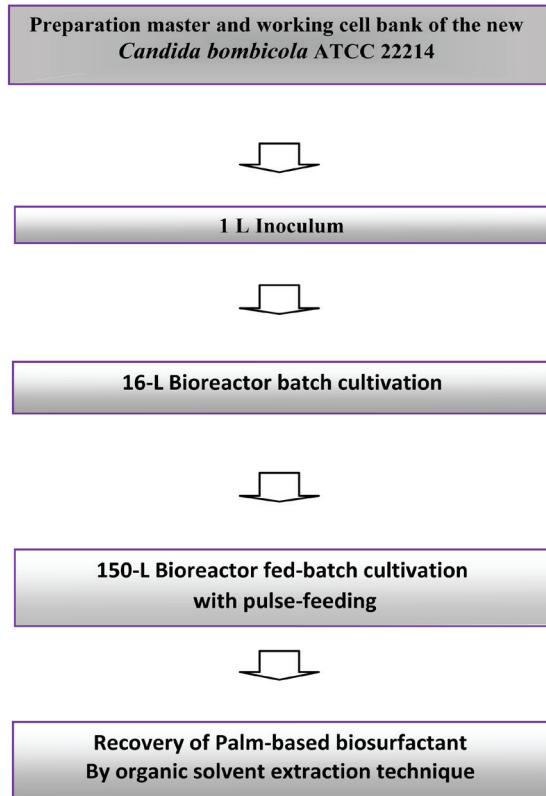
### Objective

This technology aims to economically scale-up production of sophorolipid biosurfactant from RBD palm oil by *Stamerella bombicola* using a new feeding strategy of RBD and glucose in a 150 bioreactor using pulse-feed substrate technique.



*Palm-based Sophorolipid biosurfactant.*

## Methodology



## Novelty of the Technology

Pulse-feed of the substrates allowed highest yield of sophorolipid biosurfactant to be achieved.

## Features

Attractive features of sophorolipid biosurfactant are associated with its environmental compatibility, high biodegradability, low toxicity, high selectivity and specific activity in a broad range of temperature, pH and salinity conditions.

## Advantages/Benefits

The benefits of this scale-up palm-based sophorolipid technology are:

- Mild temperature bioreactor utilisation.
- Easy control of processing parameters.
- High productivity and recovery.



150-L stainless steel fermenter.

## Economic Analysis

$$\begin{aligned} \text{Payback period formula} &= \frac{\text{Cost of investment}}{\text{Average revenue}} \\ &= \frac{\text{RM 2 600 000}}{\text{RM 851 981.25}} = 3.05 \text{ years} \end{aligned}$$

## Viability Parameters

Payback period (year)	:	3.05
Benefit to cost ratio (BC Ratio)	:	1.33
Internal rate of return (IRR)	:	17%
Nett present value (NPV)	:	RM 429 491.12
Return on Investment (ROI)	:	58%

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