

Headline	Sweet feat		
MediaTitle	The Star		
Date	09 Jan 2014	Color	Full Color
Section	StarTwo	Circulation	298,821
Page No	13	Readership	1,839,000
Language	English	ArticleSize	938 cm <sup>2</sup>
Journalist	cavina lim	AdValue	RM 43,515
Frequency	Daily	PR Value	RM 130,545



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# Sweet feat

USM student who uses oil palm syrup to make toffee wins gold at British Invention Show.

**S**YUHAIRAH Ahmad's toffee took a gold medal at an international competition, though. It was at the British Invention Show 2013 that the Food Technology graduate beat researchers, lecturers and students from 20 countries to win the gold medal.

Syuhairah, from Universiti Sains Malaysia School of Industrial Technology, said her final year project explored the application of oil palm syrup in the production of toffee. Her research was aimed at tapping the potential of the sap in oil palm trunks, as a food ingredient. The inner part of the oil palm trunk contains large quantities of oil palm sap; in fact, the sap makes up 70% to 80% of the trunk weight. "We are the second largest palm oil producer in the world. An estimated 8.8 million tonnes of oil palm trunk biomass are produced annually," says Syuhairah.

Syuhairah notes that the oil palm industry faces the challenge of utilising the biomass residue in an efficient, sustainable and environmentally-friendly way.

"Oil palm trunk can be used as a source of renewable energy and lumber. The outer part of the trunk is used for the production of compressed wood and lumber, while the inner part is discarded because it is not strong enough due to the high percentage of sap content," Syuhairah explains.

When the idea to utilise sap in oil palm trunks for the production of toffee was mooted by her project supervisor, Assoc Prof Dr Fazilah Ariffin, Syuhairah decided to take up the challenge for her final year project.

"The sap contains a high amount of glucose. It has been used as a source of sugar for the production of raw materials, namely bioethanol and lactic acid. I believe there is not enough usage of the inner part of the oil palm trunk in food application," says the bubbly 23-year-old environment lover.

Realising the potential of using the sap as an alternative natural sweetener, Syuhairah – with the assistance of her supervisor and another lecturer, Prof Dr Rokiah Hashim, as well as the faculty's Masters student, Syazana Sulaiman



Out of the oil palm trunk comes a yellowish sap which undergoes a simple heating process until it turns into a brown syrup.

– ventured into producing agro-waste oil palm trunk syrup for making toffee.

**The project involved a collaboration with the Forest Research Institute of Malaysia, which provided the oil palm trunk.**

"Toffee is caramelised sugar which has been cooled in thin sheets. The idea of using the sap of oil palm trunk for making toffee, has not been explored," says Syuhairah.

"In the production of toffee, sugarcane is used as a natural sweetener. The sap from oil palm trunk and sugarcane share similar properties. Sugarcane is made into table sugar which is high in sucrose, while oil palm syrup which is made from the sap, is high in glucose. Making oil palm syrup from the trunk sap is not exactly rocket science.

"Firstly, the oil palm trunk is pressed using a mechanical scale which acts like a juicer, until all the sap is squeezed out.

"A centrifuge is used to remove all the sediments and unwanted solid particles from the freshly squeezed sap before the sap undergoes a simple

heating process at 145°C until it turns into syrup. The syrup must be cooked until it reaches the standard of 65 to 75 degree brix (measurement for total soluble solid) for it to be considered a syrup, according to the Food Act and Regulation Act in Malaysia.

"To make the toffee, the oil palm syrup is then mixed with whipping



Syuhairah demonstrating one of the processes in the making of the Elaies toffee.

cream, milk and sugar," explains Syuhairah.

Another objective of her project is to reduce the use of commercial glucose syrup in toffee production, and substitute it with oil palm syrup.

"The main aim is to eliminate wastage of biomass which is produced during the replanting of oil palm," says Syuhairah. Syuhairah experimented with the formulation for the toffee until she arrived at the formula of 60% oil palm syrup and 40% glucose syrup for the best toffee in terms of aroma, flavour, texture and colour.

The Elaies toffee, as she calls it, is a non-

crystalline sugar confection; each toffee is coated with chocolate.

"This new toffee is high in calcium, iron and contains a wide range of amino acids. It has an original and unique toffee flavour," says Syuhairah.

"Commercially, 500ml of glucose syrup is sold at RM19.90 while the price of oil palm syrup can be reduced by half," she added.

Syuhairah, who is currently pursuing a Masters degree in Food Technology, hopes to take her research further by using the same raw material in oil palm trunks in other food applications, such as natural colouring for confectionery.

She added that she might be holding discussions with the Malaysian Palm Oil Board for her research to be recognised as a breakthrough invention in successfully utilising oil palm sap in food application.



**Golden gal:** Syuhairah Ahmad experimented with the sap in oil palm trunks to find an alternative sweetener for toffee.