CLASS REP

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Swede success for Malaysian food scientist

"HAPPINESS is when your research findings catch media's attention."

This was the posting made by Dr Noor Liyana Yusof, 30, on her Facebook page on Oct 1.

She had every reason to feel elated as her research findings grabbed headlines in Swedish newspaper Sydsvenskan among others — practically, icing on the cake after earning her PhD in Food Technology from Lund University in Sweden a month earlier.

Her thesis — Vacuum Impregnation of Spinach Tissue: Metabolic Consequences and their Potential Industrial Applications — not only had the academia excited but also captured the industry and public's imagination.

Through her research, Noor Liyana came up with a method to reduce the nitrate content in spinach by up to 70 per cent — thus, making the vegetable safe to be consumed by young children, particularly infants. Via the use of sugar and vacuum, the method stimulates the metabolic activity by which the leaves convert nitrate into proteins instead of toxin substances.

"This method can be used by the industry to increase food quality, particularly vegetables which has high nitrate content," she said.

Passionate in her field of study, Noor Liyana's scholarly pursuits started at an early age in her hometown of Kuala Terengganu. Born to an English teacher mother and technician father, the fourth of five children demonstrated her academic potential by skipping Year 4 in primary school — progressing to Year 5 straight after Year 3 under the Education Ministry's Penilaian Tahap Satu (PTS) scheme or also known as the Level One Evaluation which was administered to Year 3 students from 1995 to 2000.

Excellence in this test allowed students to skip Year 4 and attend Year 5 instead. However, the test was removed from 2001 onwards due to concerns that parents and teachers were unduly pressuring students to pass the exam.

She had her secondary education at Sekolah Menengah Kebangsaan Sultan Sulaiman and proceeded to Kolej Matrikulasi Negeri Sembilan in Kuala Pilah after SPM. From there, she continued her studies at the bachelor degree level in the field of food science and technology at Universiti Putra Malaysia (UPM) in Serdang, Selangor.

"I felt that this field has a wide scope and is very unique. After all everyone loves food and to me, food connects people. The course was my first choice and I graduated with flying colours. Upon graduation, I was offered a contract job as a food technology officer at the Food Safety and Quality division of the Terengganu State Health Department. Nine months into the job, the then dean of UPM's Food Science and Technology Faculty Professor Datuk Dr Mohd Yazid Abd Manap asked me to come back to the university and become a tutor at the Food Technology Department," she shared.

She became a tutor at the faculty in 2009 and was given a year to secure a place and a scholarship to further her studies.

"I was offered to join the European Master Degree of Food Study, a world-class programme involving four leading universities in Europe: the Wageningen University in the Netherlands, University College Cork in Ireland, Agro Paris Tech in France and Lund University in Sweden," said Noor Liyana.

The two-year programme required participants to spend 2.5 months at each university where Noor Liyana and her fellow students studied different courses. This involved lectures, practicals, study periods, seminars, industry visits, language training and communication and social activities taught at four different European universities during the first year of the programme.

"The second year was focused on a thesis project, where we worked on applied research at the location of one of the programme's partnering multinational food companies. I had the opportunity to work on research related to elongation of food life at Unilever's food research laboratory in Vlaardingen, The Netherlands in collaboration with Wageningen University," she elaborated.

"My master's was funded by UPM's Tabung Amanah. I started the master programme in 2010 at the age of 23 and completed it in 2012, after which I returned to Malaysia and reported for duty at UPM," said Noor Liyana.

For her PhD, Noor Liyana wanted to study at a "rare" institute of higher learning with world-class infrastructure and ranking. That was the reason she decided to study in Sweden — specifically, Lund University.

Lund University holds the 78th position in the QS Ranking 2018; 93rd place in the Times Higher Education (THE) World University Rankings 2018; 94th place in the U.S. News Best Global Universities Rankings 2017; and Top 101-150 university in the Shanghai Jiao Tong University's Academic Ranking of World Universities (ARWU 2017).

On top of that, Sweden is ranked among the world's top happiest nation in the world.

"What I mean by rare is that there are not that many Malaysians, specifically Malays attending the university. It's not that I do not appreciate my countrymen but the opportunity to immerse in the culture of others seldom comes. So the chance to assimilate with locals should be optimised fully. It is often the norm for Malaysian students abroad to slip into comfort zone, befriending fellow Malaysians only, but not for me. Also, I had visited Lund University during my master's degree and I was taken by the learning environment, the nature and style of living that I began to harbour the ambition of furthering my studies there," she said.

Her application process went smoothly, starting from her very first email to her PhD supervisor Associate Professor Dr Federico Gumez Galindo — a food technology senior lecturer at the Department of Biology, Lund University. Within six months, at the age of 26, she was accepted by the university and was able to secure a scholarship from the Higher Education Ministry to begin her doctoral studies. "My PhD journey took four years and six months. At 30, I obtained my PhD. *Syukur alhamdulillah*," she said. Noor Liyana also commended the research culture at Lund University.

"It is not stressful at all. I consider myself very lucky to have a super-efficient and dedicated supervisor, friendly and helpful labmates, efficient lab technicians — all of whom contributed to smooth research work and a flexible working environment. One of the traditions that I will always remember is "fika" — which means coffee break in Swedish — every 10am and 3pm. We, the doctoral candidates and our lecturer would gather and share everything under the sun — not confined to research and get updates on each others' lives," she said.

Armed with the motto "don't be busy, be productive", Noor Liyana does not measure output by the hours spent but rather how well time was spent in terms of her studies and research.

"I had meetings with my supervisor once a week and they were just 20 minute updates unless there were arising issues. Then off to the lab I went again. For me, you don't have to have a meeting just because you have to have a meeting. Get what I mean?"

But it was not all work and no play for Noor Liyana.

"My hobby is baking and travelling. I have visited some 25 countries — mostly in Europe. If interested you could have a look at my Instagram account gayahgebu," she said.

Asked what she hoped for her research findings from her PhD thesis, Noor Liyana said naturally she wanted it to be utilised as much as possible in Malaysia.

"To me, the results of the research should benefit the public and be fully applied by the food industry to produce food that is safe and of high quality. Knowledge is meant to be shared," she said.

She is now back in UPM as a senior lecturer.

NYHETER

FORSKNING

Grönt för spenat – utan nitrat

SVERIGE

Forskaren Liyana Yusof vid Lunds universitet har kommit på hur man kan göra spenat nyttig även för de minsta barnen. Det behövs socker och lågtryck. Vi har receptet.

Liyana Yusof är doktorand i livsmedelsteknik vid Lunds tekniska högskola. Hon har utvecklat en metod som gör att nitratet i spenatbladen bryts ner.

Därmed kan spenatens rykte som supergrönsak stärkas ytterligare.

Spenat har alltid haft gott anseende, men fick sitt mytologiska genombrott med seriefiguren Karl-Alfred 1929. Denne dynamiske sjöman blir otroligt stark när han äter spenat.

Även om spenatens rykte som muskelbyggare har visat sig överdrivet är bladen nyttiga. Spenat innehåller exempelvis vitaminer, antioxidanter och tre gånger så mycket järn som broccoli. Samt nitrat.

Nitrat är en kväveförening som finns naturligt lite varstans. I kroppen omvandlas den till kväveoxid. Detta är bra för de flesta, eftersom kväveoxid sänker blodtrycket, ökar syreupptagningen och skyddar mot magsår.

Men i höga doser kan det bli tvärtom, så att syretransporten i blodet försämras. Små barn är extra känsliga och har lättare att drabbas av detta, som kallas methemoglobinemi.

Därför ska barn under ett år inte äta spenat i större mängder, rekommenderar Livsmedelsverket. Först därefter kan mängden ökas gradvis.

Nu finns tekniken som gör att även små barn kan äta spenat. Efter fem år vid Lunds universitet har Liyana Yusof från Malaysia lagt fram sin doktorsavhandling i ämnet.

– Nitrat är inte nyttigt för någon i jättestora mängder. Mina försök har visat hur man kan reducera nitrathalten med 70 procent i spenat.

Detta behöver du: Ett tiotal blad av spenat. En bägare med femprocentig sockerlösning. En bit grönt plastnät. Samt en rejäl glasbehållare med lufttätt lock, kopplad till en luftpump.

Metoden är billig och kräver inga kemikalier, säger Liyana Yusof.

1 Knipsa bort de grova stjälkarna och lägg spenatbladen i bägaren med sockerlösning. Lägg på nätet så att bladen pressas ner under ytan.

2 Placera bägaren i glasbehållaren, lägg på locket och sätt igång luftpumpen.

3 Vänta medan lufttrycket i glasbehållaren minskar från normala tusen millibar till hundrafemtio. Det tar ungefär elva minuter.

4 När trycket sjunker bildas bubblor på spenatbladen. Det är luften i grönsakens vävnader som pressas ut.

5 Låt bladen stå i 150 millibar (nästan vakuum) i ungefär en minut innan du långsamt låter lufttrycket stiga.

6 När trycket stiger sugs istället sockerlösningen in i spenatens vävnader. Upprepa för säkerhets skull hela proceduren.

7 Placera spenaten mörkt i ett rum som håller åtta grader. Låt stå i tre dygn.

8 Färdigt! Nu har du spenat med 70 procent mindre nitrat än vanligt. Den har ökat med ungefär en fjärdedel i vikt, har mörknat lite och håller sig bättre.

Vad har hänt? Nitrat har omvandlas till proteiner i spenatbladen. Det är en helt naturlig reaktion som kallas metabolism. För den krävs energi och denna kommer från sockerlösningen.

– Inga andra tillsatser eller kemikalier behövs. Det är en helt naturlig process, säger Liyana Yusof.

Blir inte spenaten sur?

Nej. Sockerupplösningen bryts ner tillsammans med nitratet. Spenaten blir då så inte mer kaloririk.

Metoden kallas vakuum impregnering. Vi Det är beprövad och används på olika typer av frukter och grönsaker som kan impregneras med olika ämnen, i olika syften.

– Vi stimulerar helt enkelt den naturliga ämnesomsättningen i spenaten. Detta är en enkel och billig metod, som lätt kan användas av livsmedelsindustrien, säger Liyana Yusof.

Häromveckan lade hon fram sin doktorsavhandling. Om några dagar återvänder Liyana Yusof hem till Malaysia för att fortsätta sin forskning vid universitet i Kuala Lumpur.

TEXT: DANIEL RYDÉN

Swedish newspaper Sydsvenskan carrying Noor Liyana Yusof's research findings.

Noor Liyana Yusof with her thesis summary before placing it on the thesis tree as per faculty tradition at Lund University.

NOOR LIYANA YUSOF

AGE
30

QUALIFICATIONS
• PhD in Food Technology from Lund University, Sweden
• European Master Degree of Food Studies from Wageningen University, The Netherlands
• Bachelor of Food Science and Technology from Universiti Putra Malaysia

CURRENT POSITION
Senior Lecturer at the Faculty of Food Science and Technology, Universiti Putra Malaysia