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## Science and tech in our backyard

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FROM the numerous National Transformation 2050 dialogues I have had with various groups in Sabah, I am heartened that many are very keen to know more about how science, technology and innovation are directly changing their livelihood for the better.

This is a reasonable quest, as the application and benefits of science and technology can either be too ubiquitous that we tend to take them for granted, or their technicalities could sound too bombastic to some and thus deterring them from further pursuit.

But I have advocated that there is nothing to fear about "science" - because it is evidence-based, it is logical and its knowledge is always obtained through observation and experiment. In other words, everyone is capable of understanding science!

As a frequent delegate of international science and technology conferences, I think Malaysia is rather unique in our approach of advancing this agenda. Not only we are fiercely promoting science, technology and innovation as the backbone of the economy and are injecting investments into technological engines of the economy such as automation, concurrently we have never left out communal innovation initiatives.

In fact the MOSTI Social Innovation programme was launched two years ago in April 2015 with a focus on fulfilling the social needs of local communities.

In the cultivation of black pepper for example,

Malaysia is the fifth largest pepper producing country behind Vietnam, Indonesia, India and Brazil. Sarawak contributes 90 per cent to the national black pepper production.

In 2011, when Tan Sri Bernard Dompok was the Federal Minister of Plantation Industries and Commodities, he requested that the Malaysian Pepper Board (MPB) introduce pepper cultivation in Sabah to provide the smallholders here more options in income-generating commodities.

Traditionally, black pepper farming requires supplies of Belian wood to make the support posts for its pepper vines. According to the **Forest Research Institute Malaysia (FRIM)**, Belian trees are naturally found in Malaysia, Indonesia and the Philippines. They grow in lowland forest and secondary forest, taking up to 120 years to reach 20 cm diameter.

This tree is nick-named "Borneo ironwood" and is a popular material for structures for a number of good reasons. It is very tough, does not rot easily and is naturally resistant. As the demand for pepper in the global market increases, so does the Belian wood.

MPB reported that the average global demand was 428,933 metric tonnes (mt) from 2014 to 2016 yet only 390,912 mt were supplied. The Malaysian Pepper Marketing Board set a target of 20,000 hectares of pepper farm in Malaysia by 2020. As of now there are 17,000 ha of pepper farms, of which 16,000 ha are in Sarawak, the rest are in Sabah and Johor.

The ancient native Bornean Belian trees are now just as precious as diamonds. Their slow growth of only half an inch a year and vast exploitation have caused their logging to be banned by both the Sabah Forestry Department and Forest Department Sarawak.

The Malaysian Nuclear Agency (Nuclear Malaysia) through its research and development programme has come up with an alternative to the Belian wood as supporting posts for black pepper cultivation - by using biocomposites. This means using a combination of natural fibres and other materials in the making of a new material, which is ultimately biodegradable and sometimes recyclable. Another advantage is that biocomposites can be easily moulded to add features to the pepper posts for functionality, such as an irrigation and fertilisation system. Nuclear Malaysia has the capabilities and expertise in applying nuclear technology in the making of biocomposites, to improve their quality and tensile strength. Since the biocomposites are composed of oil palm empty fruit bunch fibre, padi dust and husk fibre, using this material would reduce solid waste disposal, carbon emission and energy consumption for waste burning.

Padi and oil palm planters would also gain additional income the sales of their commodity wastes. This is a classic example of "waste to wealth"!

By collaborating with the Sabah Agriculture and Food Industry Ministry, these biocomposite posts have been piloted in pepper plantations in Kampung Moyog, Penampang for 18 months, replacing Belian wood. In mid-November, over 20 planters from eight villages from Tamparuli and Kudat participated in the second phase of this MOSTI Social Innovation project. The project can be expanded to other industrial creeping plants such as grapes, tomatoes and legumes.

Similarly, fish cages for aquaculture breeding can be made from nanohybrid biocomposites, which is more weather and saltwater-resistant, replacing wood as the building material. It is more affordable than high-density polyethylene (HDPE) floating fish-culture cages. At three metre squared for example, a nanohybrid biocomposite aquacage costs less than RM 10,000, compared to RM 12,000 for a HDPE cage. This project has been rolled out in Pulau Simpang Tiga in Langkawi and Semporna in Sabah. Besides its affordability, aquaculture farmers have praised its easy installation, low maintenance and its uniform structure that made standardised operations possible.

Our future plans to promote biocomposites applications include a programme to nurture small and medium-sized enterprises (SMEs) in manufacturing biocomposites for a variety of practical applications. Besides the examples above, biocomposites could be a material for riverbank protection replacing mangrove piling, for furniture and construction components.

So these examples demonstrate that science and technology does not serve only the privileged few. It truly serves all walks of life. And through innovation, our knowledge in science and capabilities in technology would solve problems in a creative manner.

Who would have thought that a seemingly simple post for black pepper farming or the cages for aquaculture is the outcome of a meticulous scientific research and requires nuclear technology in its production?



**Distributing a biocomposite post to a participant of the Black Pepper Cultivation Workshop on 18th November, organised by Persatuan Penanam dan Pengusaha Lada Hitam Sabah (PLAS).**