

Great research is nothing if not shared
Minister Of Agriculture,
Datuk Seri Ismail Sabri
message:

Pg2



Make Inclusive
Innovation a way of life
Message from the
Director General of
MARDI, Dato' Dr Sharif
Haron

Pg2



1st Edition
2014
MARDI

March 2014
Vol: 001

KDN:PP17330/03/2014

SCIENTIAMARDI

Agricultural Transformation

Aerob rice, a key to Malaysia's food security

"Aerobic rice is a potential water saving rice production system and will be the best option of producing rice in water scarce environments"



Nanocomposite tray from agrowaste for serving food

Pg3

Weedy rice problem solved

Pg4

Ground breaking method of identifying raw and processed meat

Pg4

Musseling into aquaculture

Pg9

Dukung anak proven as potential cancer cure

Pg11

By Dr Sariam

The possibility of declining water availability in the future is a key threat to Malaysia's food security, which mainly relies on irrigated lowland rice production system which consumes large amounts of water.

The current system irrigates rice fields with 1,200 – 2,000 millimetres of water, which is more than the actual field and crop requirements.

The reasons for this expected decline in water resource are diverse and location-specific. They include decreasing quality, decreasing resources, and increased competition from other sectors.

The increased demand of water for domestic

and industrial uses is likely to receive priority over irrigation, causing less water to be made available for agriculture and force farmers to use less water in rice production.

The declining water availability for irrigated rice production may change the way rice is produced in the future. Among the more promising rice production systems that can adapt to water scarcity in rice production is alternate wetting and drying, saturated soil conditions, aerobic rice and improved hill paddy production systems.

All water-saving rice production systems use less water and expose rice fields to periods without standing water.

Yield and productivity were comparable under saturated conditions but lower yield was

observed when rice was grown under drier conditions than from flooded rice.

Increased growth, higher dry matter production and yield of rice under flooded conditions have been attributed to increased nutrient availability due to physical, chemical and biological reactions in soils.

Rice production under saturated soil conditions is an alternative to alleviate the problem of water shortage in irrigated lowlands with proper irrigation infrastructures. Rice grown under saturated soil conditions reduced water input between 14 and 22% and this represents increased water productivity when compared with flooded rice.

More page 3

Durian goes international

Durian is not something that we immediately see as a star on the international fruit market but the king of fruits is slowly making its mark on the world, thanks to its increasing popularity among mainland and overseas Chinese.

Singapore remains the biggest market for Malaysian durians, importing RM25.5 million in 2012, followed by Hong Kong which bought over RM2 million of the thorny delight and the third biggest market is mainland China which consumed RM1.5 million worth of the fruit.

Indonesia and Australia follow closely behind these key export markets and these are markets with large overseas Chinese populations.

In the new millennium, durian has become an exotic culinary experience with wealthy fans flying into Malaysia and Singapore specially to enjoy the best fruits at their prime.

This rise in export is in tandem with the increasing popularity of durians among Malaysian Chinese and this has led to a revival of the crop which was slowly losing popularity in the 1990s.

Before the decline, demand for durians came mostly from the indigenous Malay consumers who were familiar with the fruit and consumed



it fresh and also fermented it for use as a cooking ingredient.

Export of durians for consumption is limited to fresh fruit and this has been made possible by research done by the Malaysian Agricultural Research and Development Institute (MARDI) which has created some of the popular varieties in the market.

The increasing popularity of durians in over-

seas markets is quite remarkable, considering that the fruit emits very strong odour and is even prohibited in Malaysian hotels. Specialised packaging has been developed to allow for air transportation without disrupting passenger comfort.

Air transport is key to the durian export market because the fruit does not travel well, having detached itself from the tree fully ripened and has a tendency to deteriorate within a few days.

The high premium that durian commands among foodies makes it possible to use the best methods for packaging and transport to ensure that it can reach the market in a palatable state.

Durian's reluctance to travel has resulted in a unique situation where wealthy enthusiasts make special trips to Malaysia just to ensure that they can enjoy the fruit at its best.

A more concerted marketing campaign for the king of fruits, building food tour packages around the durian season, can be explored as a way of encouraging durian consumption and ensuring positive experience of the fruit.

More page 6-7

In brief

Trimble rolls out crop-scouting drone

Officials with Trimble announced this week they're introducing a drone system for aerial imagery for scouting for pests, weed pressures, and nutrient deficiencies.

- Agriculture.com

Your Farm in the Future: Future seeds

Biotech researchers promise that every three to five years we may expect next-generation herbicide tolerance, insect resistance, and drought tolerance (at least in corn).

- Agriculture.com

Urine-to-Fertilizer Campaign Launches in Amsterdam

Sewage is rarely thought of as a valuable resource, but the Green Urine campaign aims to change that—by utilizing urine for phosphate fertilizer and raising awareness of its benefits.

- Triple Pundit

Aquaponics a growing trend in urban agriculture

Non-root vegetables, like tomatoes, cucumber and lettuce, can thrive in an aquaponic system, while edible fish, like tilapia, can be raised to be eaten in the same setup.

- CBC News

Great research is nothing if not shared

Minister Of Agriculture, Datuk Seri Ismail Sabri message:

The Malaysian Agriculture Research and Development Institute or MARDI is known among research organisations around the world for its achievement and the numerous awards and recognition that it brings home for Malaysia but great research is nothing if it is not shared.

For all the good work that is done by MARDI, many are still not fully aware what this fine organization has to offer.

Sharing the result of successful research is not just a logical next step, it is MARDI's Corporate Social Responsibility, the Government funds research in order to allow the people to reap the economic benefits of being ahead of the competition.

Perhaps MARDI is cautious about blowing its own trumpet and we understand that but in today's fast changing world, we cannot afford to allow good new techniques and knowledge to sit in a cabinet gathering dust and becoming out of date before it is even commercialised.

I would like to see MARDI take on the role of educating the public about what kinds of new research development results can be taken to market. A nationwide roadshow certainly would not go amiss in this situation.



When tabling the 2014 Budget, our Prime Minister Datuk Seri Najib Abdul Razak made it clear that wants farmers, livestock breeders and fishermen has to be more innovative and progressive to boost income and their standard of living.

Our farmers and breeders need to reexamine their old ways and methodologies and unshackle themselves from conventional and static think-

ing and start thinking about ways to bring Malaysian agriculture into the 21st century.

This is crucial if we want to improve our agriculture yields and fulfill everyone's wish for food security through self-sustenance. As we progress, demand for food will increase and Malaysians become more affluent and together with a growing population that recently hit the 30 million mark, can we afford to remain in our comfort zones.

Scientists, researchers and technologists at MARDI must see themselves as guardians of the nation's future and you can only fulfill this role by injecting the spirit of innova-

“Scientists, researchers and technologists at MARDI must see themselves as guardians of the nation's future”

tion and improvement into Malaysian agriculture.

Once farmers, livestock breeders and fishermen know what new ideas and technology they can extract from MARDI, they will keep coming back for more as they realize how innovation can lead to improvements in yields and therefore their income and competitiveness.

Agencies like MARDI should be more aggressive helping this group to produce more at a lower and more sustainable cost through optimum application of resources.

Since taking over this ministry a year ago, one of our main concerns is the fact that the agriculture sector is monopolised by the older generation due to the widespread negative perception of the industry.

Partly, this has to do with the traditional farming methods which are still widely practiced and this usually

means working hard under the hot sun for relatively modest economic reward.

If the younger generation persists with this perception and refuses to take the mantle of the agriculture sector, the country's food security in the future is at risk.

This is why the Ministry of Agriculture has adopted as its main agenda, attracting the younger generation to get involved in the industry by creating Young Agropreneur Unit to facilitate the need of the young farmers.

The Young Agropreneur Council which comprises successful agriculture entrepreneurs and several Non-Governmental Organisations has had a few meetings and is currently setting the agenda of attracting more Malaysians to take part in agriculture as a vocation of choice.

The MOA is serious in this mission and we have instructed all agencies to help and this includes offering loan facilities to help new Agropreneurs to set up their patch.

Agriculture transformation must start now and it must start with a change of attitude and a willingness to accept new technology and working together to make agriculture once again become the main industry for this country!

In closing I would like to congratulate MARDI coming out with this newsletter which can play an invaluable role in sharing with all stakeholders including the commercial sector, the various research success that is just waiting to be taken to market.

I sincerely hope Scientia can become a beacon for other research agencies in sharing their work and making Malaysia a developed country by 2020.



EDITORIAL

Dear Friends of MARDI,

Welcome to the First Issue of the 'SCIENTIA, MARDI's R&D newsletter. We provide bimonthly updates on R&D activities and share featured articles on diverse issues of interest in agriculture and Agro food policy.

At MARDI, we are dedicated to contributing to the success of our customers, stakeholders and valued and trusted partners. We want to work in closer partnership with our clients and stakeholders.

We have revised our approach to planning and delivering stakeholder engagement and this newsletter will deliver some or all of the required information as suggested.

A central component of the newsletter is a roundup of details of scientific events and research activities concerning food, agriculture and related fields.

This first issue of SCIENTIA outlines the scientific breakthroughs and events recently organized and introduces other initiatives and events to be held in the coming period.

A relevant section is the featured articles written by MARDI's scientists and fellow personnel from the Ministry of Agriculture & Agro based Industry which highlights key initiatives and new technology that has been developed.

The continuous nature of our R&D activities and the need to maintain momentum ambition and enthusiasm is a significant challenge to all of us in MARDI.

It is also our great pleasure to remind you that major events such as MAHA (Malaysian Agriculture, Horticulture and Agro tourism Showcase), the foremost trade show for agriculture in Malaysia, will be held at MAEPS from 20 - 30th November.

The future success of our Newsletter depends on your comments, contributions and ideas! We do encourage all of you to help improve SCIENTIA so that it serves your needs as researchers and those of the market which will commercialise MARDI's research efforts.

We look forward to better serve the need for information exchange throughout the food and agriculture community. We hope you will find this a useful update on our activities and would like to thank everyone who has supported this edition by providing useful information.

We hope you enjoy this INAUGURAL Issue and welcome feedbacks to ensure we serve you better.

DATO DR SHARIF HARON
DIRECTOR GENERAL MARDI

SCIENTIAMARDI
Agricultural Transformation

Editor In Chief

- Datuk Sharif Haron
(Director General MARDI)

Advisors Editorial Team

- Dr Mohamad Roff Mohd Noor
(MARDI Strategic Planning and Innovation Management Division)
- Ramliah Md Isa
(Director Technical Service Centre (TS))
- Ainu Husna MS Suhaimi
(Deputy Director International Relations and Strategic Networking Program, Corporate Communication, International & Quality Division)
- Maheswary N Vellupilai
(MARDI Senior Research officer)

Copy Writer

- Shamsul Bahari Mohd Yunus

Designer

- Sham Hosni

Art Director

- Spice Communications Sdn Bhd

For enquiries, please contact

Scientia MARDI
MARDI Headquarters,
Persiaran MARDI-UPM,
43400 Serdang Selangor,
Tel : 603-89437111
Faks : 603-89843664
Email : editorscientia@gmail.com

Make Inclusive Innovation a way of life

Message from the Director General of MARDI, Dato' Dr Sharif Haron

Innovation is crucial towards achieving a high-income, high productivity economy that will propel the country towards a developed status.

Inclusive innovation will include R&D in interdisciplinary studies that will result in creation of practical designs and artefacts and business models and services, processes or products that can be seen as practical innovative solutions to market or societal problems that create a better future.

This approach will consider the interaction of humans and physical environment throughout each step of the innovation creation value chain which will sometime result unplanned and unforeseen new inventions and capabilities for a better future.

Open innovation models that embrace the innovation solution's ecosystem yield distinctive, relevant ideas with both the commercial and social development possibilities.

The source of innova-



tion increasingly flows from individuals who are unconstrained by set cultures or organizations and deeply committed to changing the world around them for the better.

The fuel to innovate is created when these kinds of people, with their vast expertise, life experience, passion and ideas, come together with free reign and in an environment poised to

support new possibilities.

Inclusive innovation studies will focus on inclusive solutions that are relevant to building Malaysia's future by creating an environment that rewards risk taking in an unfettered environment allowing for radical, unorthodox approaches with the potential to disrupt – a risk that is generally too costly for existing businesses or governments to take.

Managing post-harvest losses

By: **Dr. Rosa Roelle**
Senior Agro-Industries and Post-harvest Officer, FAO Regional Office for Asia and the Pacific, Bangkok

“South and South-East Asia contributes 23% of total world food waste, making us the second largest contributor to the total after industrialised Asia”

Post harvest losses account for the majority of food loss in developing countries in Asia and the Pacific region and the levels of losses are highest in the traditional chains that supply mass markets in the region.

Among the biggest contributors to post harvest losses are post-harvest diseases, pest infestation, poor bulk packaging, poor transportation practices and the human factor.

With increasing population and more competitive demand for land and agriculture space, unchecked food losses either through consumer wastage or post-harvest losses have the potential for causing nutrition deficiency in the region in the future.

Production oriented traditional supply chains with weak marketing orientation and fragmented production units tend to limit the use of the latest post-harvest technologies and this lead to higher post production losses due to the higher number of layers of handlers between production and consumption.

Traditional farmers and distribution chains have limited knowledge of modern post-harvest technologies and this coupled with minimal institutional support for technology improvement is perpetuating the situation.

The rate of food waste increase is



further exacerbated by the increasing affluence of the region which is now causing more food waste to be generated at the dining table.

South and South-East Asia contributes 23% of total world food waste, making us the second largest contributor to the total after industrialised Asia.

The issues to be addressed in the effort to reduce food waste are many and key among them are raising awareness and advocacy to change consumer and stakeholder attitudes to food loss and food waste.

The development of post-harvest loss reduction strategies for the region is another important step and this can be achieved through capacity building of stakeholders in food supply chains.

A policy that promotes the environment for post-harvest development in the region should be in place with investments in infrastructure to support post harvest technologies.

The Food and Agriculture Organisation (FAO) of the United Nations recently launched the Save Food Asia and the Pacific Campaign as part of their Global Initiative on Food Loss and Food Waste Reduction : Save Food.

The regional campaign is aimed at raising awareness and draw attention to the high levels of food losses and the growing problem of food waste and their impacts across Asia and the Pacific Region.

Aerob rice, a key to Malaysia's food security

From page 1

Nitrogen fertilizer requirement was about 18 – 26% lower for rice grown under saturated soils than flooded rice due to better nitrogen fertilizer utilization.

At the same time, the saturated soil conditions will minimize golden apple snails (*Pomacea canaliculata*) infestation since the presence of standing water in the field causes snail infestation to spread rapidly.

Aerobic rice is a potential water saving rice production system and will be the best option of producing rice in water scarce environments.

The availability of aerobic rice varieties that can withstand aerobic conditions, respond well to irrigation and fertilizers, compete against weeds and deliver high yield, is crucial to making aerobic rice cultivation successful.

Yield of aerobic rice is generally lower than flooded rice especially when grown continuously for several seasons, mainly due to irregular water availability, weed infestation and nutrient stresses, and a combination of these factors.

Since weeds are major constraints to aerobic rice, it must be effectively controlled through integrated weed management.

Management and options to improve the early growth of aerobic rice in order to make the crop more competitive with weeds are essential. In addition, appropriate nutrient and other crop management practices will ensure a successful aerobic rice production system.

Conclusion

The impact of possible future water shortage on national rice production may be mitigated or overcome completely if rice can be grown with minimum water under saturated and aerobic soil conditions.

The two rice production systems mentioned however need different management system from the normal flooded rice in order to produce good rice yield.

Growing irrigated rice under saturated conditions offers great water-saving potential for rice cultivation in Malaysia and may play a key role in ensuring the sustainability of irrigated rice production.

Reduction in yield for rice grown under saturated conditions, if any, can be avoided through

various measures such as timely irrigation and coordination of irrigation with fertilization and weed control.

A well-leveled field, field and in-field ditches to facilitate irrigation and more intensive land preparation are some of the pre-requisites for successful rice production in saturated soil conditions.

Aerobic rice cultivation is another alternative for producing rice in water scarce environment. To make aerobic rice cultivation successful, the availability of aerobic rice varieties is crucial.

The aerobic rice varieties grown must be able to withstand aerobic condition, responds to irrigation and fertilizers, competitive against weeds and deliver a high yield.

Since weeds are major constraints to aerobic rice, it must be effectively controlled through integrated weed management. Management and options to improve the early growth of aerobic rice in order to make the crop more competitive with weeds are essential.

In addition, appropriate nutrient and other crop management practices will ensure successful aerobic rice production system.

The development of rice production technology in water scarce environment will increase rice production and ensure that national rice production and the Self-Sufficiency Level (SSL) in rice will not be affected by the water scarcity due to climate change.

Component	Amount of water saved (mm)
Land preparation (no puddling)	190
Seepage and percolation (no standing water)	250
Evaporation of surface water	80
Transpiration	25
Total	545

Source: Chan, C.S. (2013)

● Amount of water saved from aerobic rice production system

Nanocomposite tray from agrowaste for serving food

By: **H. Azman and A.K. Faewati**
Mechanisation and Automation Research Centre, MARDI Serdang, Selangor, Malaysia

Recycling is an important way of reducing our consumption of natural resources and one of the ways is by re-using biological fibre and biopolymers from agrowaste and converting them into natural biocomposites.

Examples of these natural

biocomposites are rice straw and rice husks that come from paddy harvesting, pineapple leaf fibre from pineapple harvesting and kenaf fibre from new commodity.

A small quantity of nanoclay is incorporated as a reinforcement to improve the properties of the nanocomposite.

The growing urgency to use environmentally friendly or 'green materials' with the aim of replacing non-degradable materials and reducing the environmental pollution that results from large amounts of plastic waste, has made

them more commercially important today.

This innovatif agrowaste product offers nanoclay strength from biodegradable materials that decompose naturally over a short period of time.

These degradable materials are very useful to the environment as it eliminates migration of styrene monomer from polystyrene into food.

The impact of using this product is very high as environmentally harmful polystyrene is prevalent in the food packaging

industry and they can be easily replaced with biodegradable agrowaste nanocomposite materials.

Apart from reducing polystyrene use, migration to the environment can reduce environmental pollution (open burning) while allowing farmers to reduce man power and cost of managing the agriculture waste.

However, the change from polystyrene to agrowaste nanocomposite may require the government to enhance consumer awareness on environment friendly material for

packaging.

These new materials have great commercial potential for the manufacture of food trays and reduce the health effect on consumers through leachate of harmful substances into food that is packed in polystyrene containers.

The production process of nanocomposite food trays is relatively simple and requires prior drying of the agrowaste materials before shredding and further grinding. They can then be mixed before final extrusion or forming through a hot-press process.

Agrowaste



PROCESSING

Drying
Shredding
Grinding
Mixing
Compounding
Shredding
Extrusion
Hot press

Product



Weedy rice problem solved: MARDI-BASF development of Imidazolinone-tolerant rice variety shows great promise

By: **Dr. Azmi Man, Azlan Shaari, Hazim Khalid, Chew See Eng (MARDI) & Lim Fung Woei and George Varghesse (BASF)**



WEEDY Rice (*Padi Angin*) is a form of weed that can cause total loss of rice yield when the infestation is very serious and because it is so similar to cultivated rice, there is no herbicide that is effective against this weed.

Imidazolinone is a known herbicide that is capable of dealing with weedy rice but it could not be used directly on Malaysia's direct-seeded fields. There was a need to integrate the herbicide with a variety of rice that is tolerant of the chemical.

A programme was initiated by the MARDI and chemical giant BASF (Malaysia) Sdn. Bhd. in 2003 to create a solution to this problem and funded by BASF,

The commercialization was carried out in two phases.

Phase 1 (2003 - 2007) involved the transfer of imidazolinone tolerant gene to the local high yielding varieties and initial line selection. Phase 2 continued with line stabilisation and varietal evaluation until 2009.

This solution should also complement current control practices such as water seeding culture, and most important of all, to give high returns. In order to achieve this goal, the objectives were defined as follows:

- To conduct a series of backcrosses to transfer the herbicide tolerant gene (PWC-16) from the donor parent to the Malaysian elite rice varieties;
- To evaluate and select elite Malaysian imidazolinone tolerant rice varieties for agronomic performance, chemical and physical properties as well as resistance to pest and diseases;
- To develop a stewardship guide

for the imidazolinone tolerant varieties.

MARDI Seberang Perai became home for the project and by the off-season of 2007, five potential imidazolinone tolerant lines were selected for purification and evaluation for yield, agronomic performance, resistance against major pests and diseases as well as physical and chemical properties of the grain.

Phase 2: The lines were further evaluated in the main season of 2007/08, from which two lines, MR220CL1 and MR220CL2, were identified as the most suitable for testing and further evaluation.

They were promoted in off season 2008 for further evaluation under large plot testing in FELCRA Seberang Perak rice granary and MADA District IV, Kedah. The introduction of these varieties is justified by the need to offer a new efficient and innovative alternative method to manage weedy rice in direct-seeded culture in Malaysia.

The combination of imidazolinone tolerant varieties with imidazolinone herbicides by BASF known as OnDuty™ is known as the Clearfield® Production System. The Clearfield system was launched on 8th July 2010 at FELCRA Seberang Perak.

This new system proved effective in controlling weedy rice infestation where no other herbicides or system can control in direct-seeding culture.

The system consists of Clearfield® certified seeds and

OnDuty™ herbicide together with a Stewardship Guide developed by MARDI and BASF. The certified seeds are available in the standard 20 kg bags that farmers usually buy and are familiar with.

The herbicide is packed in a box with 4 sachets of 31 g/sachet. The seed rate is at 140 kg/ha where in the main granary area of MADA in Kedah, two bags (2 x 20 kg) per relong Kedah (3.5 relong Kedah = 1 ha) is used which is the common seed rate practiced by farmers.

The OnDuty™ rate is at 217 g/ha (7 sachets) whereby in Kedah two sachets (2 x 31 g) per relong Kedah is applied. The certified seeds and OnDuty™ is sold together as a package.

Benefits of the Clearfield Production System

From the results and experience in trials carried out at various locations in Malaysia from 2003 to 2010, the following substantial benefits were observed:

- Clearfield Production System for rice is cost effective; whereby an additional RM250 expenditure in weeding cost gives an additional yield increase of more than 1 t/ha;
- Early and effective control of weedy rice will prevent any early competition of weedy rice which will cause losses and damage to the wet sown rice crop;
- Reduce contamination from weedy rice, thereby improving

the quality of harvest and reducing weedy rice dockages;

- Reduce the amount of herbicides released into the environment.

The excellent pre-emergence activity of OnDuty™ allows delay in flooding. The delay in water supply also inadvertently reduces Golden Apple Snail damage in rice fields where the snails remain inactive under saturated field condition.

Current and normal agronomic practices used by farmers are sufficient for the application of Clearfield® Production System.

Economic Impact

Studies have shown that Clearfield plots yielded 2.5 t/ha more than conventional plots; correspondingly net income was higher by more than RM2,700/ha.

In FELCRA Seberang Perak rice granary, Clearfield Production System has given a good impact on rice production where this system was first introduced in 2010. During season 1/2010, only 50 ha of rice fields used Clearfield Production System which gradually increased from season to season until about half of the whole area (60%) adopted this technology in season 1/2013.

Rice yield production gradually increased from season to season and in season 1/2013, an average rice yield of 7.02 t/ha was achieved, the highest yield in the history of FELCRA Seberang Perak rice granary.

Malaysian innovation: Ground breaking method of identifying raw and processed meat

BY: **Haslina H., Keely B.J., Faridatul A.M.N., Raja Arief Deli R.N., Noorhapizah N.**
Food & Agricultural Analysis Laboratory, Technical Services Centre, MARDI & Department of Chemistry, The University of York, Heslington, UK

"The existing technologies have a limitation on processed food that has been heated in the production process and also in pure fat-based products."

Identifying animal species in food is not only critical for the determination of *Halal* food but it is also important in enforcing the Food Labelling Regulations. Mixing undeclared animal species in food products is illegal under Food Labelling Regulations.

Apart from regulatory reasons, the inclusion of less desirable animal meat in a food product can have economic, health, food safety and religious implications to the consumers and we are all consumers.

Several methods have been developed to identify meat species including electrophoresis, chromatography, DNA hybridization and immunoassays. Immunological techniques, including agar-gel immunodiffusion (AGID) and enzyme-linked immunosorbent assay (ELISA), are most commonly applied for meat species identification.

The existing technologies have a limitation on processed food that has been heated in the production process and also in pure fat-based products.

This limitation is critical because most foods consumed in developed countries have been subjected to varying degrees of heat treatment

at one stage or another, either through cooking, baking, broiling, toasting, roasting, canning, concentrating, pasteurising, drying or frying to modify its flavour or texture and to improve its' storage ability.

The adulteration with pure fat and oil with different/other animal species is difficult to detect using current technology.

Our invention works on the basis of identifying animal species in raw and thermally processed/cooked conditions based on molecular levels of animal fats.

The invention involves the fractionation of triacylglycerols (TAGs) on analytical instrumentation and the profiles are analysed by chemometrics to reveal the differences between animal species. The results remain reliable even when analysing processed products.

This is an entirely a new approach for animal species identification as TAGs from animal fat have not been completely resolved elsewhere.

Using TAGs as an analyte, which is stable at high temperature, offers clear and distinct advantages in determining animal species in heat processed food products.

The fact that almost 96% of animal fats contain TAGs makes it the perfect analyte for detecting any form of adulteration with fat and oil from undeclared animal species in the food products. Fractionation of TAGs overcomes the limitation of the existing technologies.

The fractionation process which can identify mammalian, avian and poultry meat sources, even in processed/cooked products, is performed using a reverse phase high performance liquid chromatography (RP-HPLC) coupled with an atmospheric pressure chemical ionisation mass spectrometry (RP-HPLC/MS-APCI) and an ion trap mass spectrometer.

To overcome the difficulties in attempting to detect adulterants that have approximately the same chemical composition as the original food product, chemometrics analysis is used

for identifying and determining animal fats belonging to different animal species.

From the principal component analysis (PCA) plot, it is concluded that the meat products of different species (beef, pork, chicken and lamb) cooked by microwave, roasting, hotpot and currying are separated and grouped well according to the species (Figure 1).

Fractionation of TAGs confirms that the discrimination of meat from different animal species is possible for both raw and cooked meat products, and reveals that the differences produced by the various processing methods are much less than the variations observed between species.

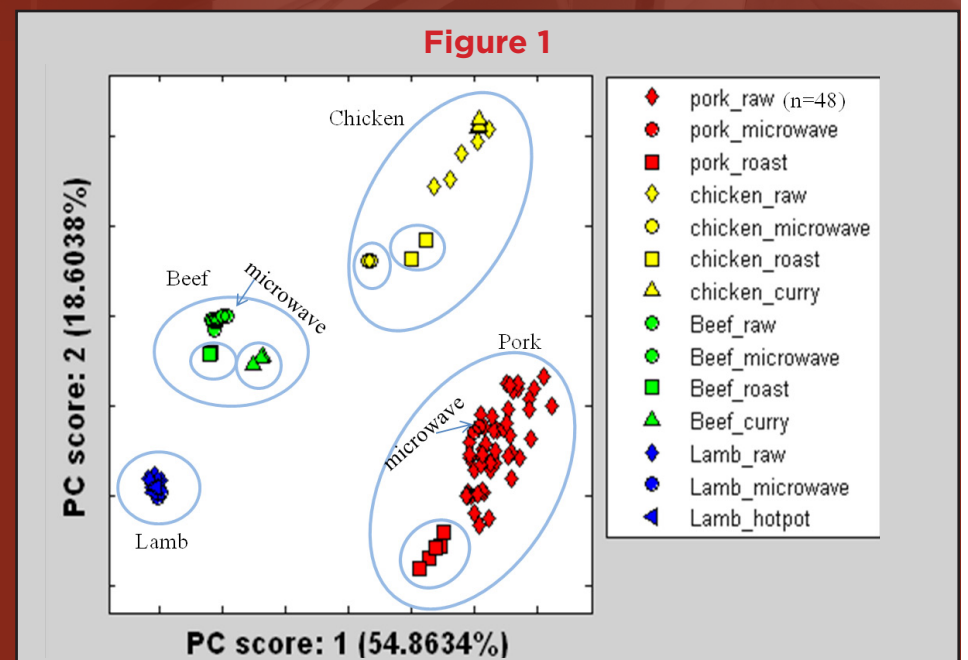
This invention has the potential of better

supporting the global processed food market by providing improved consumer confidence that any form of adulteration can be clearly detected.

This is very important for the groups of Vegetarians, Muslims, Kosher, Hindus and other consumers that are particular about their diet.

This latest technology will also enhance the capability of enforcement and regulatory agencies and departments and assist quality control and quality assurance departments of food manufacturers.

In general, this technology has potential to support the global value of the *halal* market processed food which is about USD2-2.5 trillion annually and socially, assisting about 2 billion Muslims worldwide.



● Figure 1. PCA scores plot of TAGs for raw and processed meat products of pork, chicken, beef and lamb

ACI-MARDI-SAAS smart fertilizer collaboration

By: **Wan Azha Wan Mustafa,**
All Cosmos

"With its green technology attributes, bacteriophage is able to replace chemical pesticides. It can be produced at a relatively low cost, is environmental friendly, non-hazardous and has the potential to increase agriculture exports and forest farming produce in Malaysia."

Agriculture industry is one that is growing at an ever-steady pace throughout the world. While Malaysian agriculture continues to enjoy positive demand in traditional markets, growth this year is expected to be gradual as it would depend on the purchasing power of consuming countries, their gross domestic product (GDP) growth, population increase and new markets.

However, number of wilt disease, in the absence of any effective treatment, would most likely result in decreased property values. The disease could destroy the entire industry and a biological practice will be an effective method in controlling from further scattering.

Malaysia's perspective in sustainable development requires balancing these competing demands to make the best use of our natural resources.

ALL COSMOS INDUSTRIES SDN. BHD. (ACI), a pioneer in bio-fertilizers, is a 100% subsidiary of All Cosmos Bio Tech Holding. All Cosmos is a Malaysian manufacturer and marketer of high grade bio-organic and bio-chemical fertilizers. They make every effort to be the innovative driving force in the biotechnology industry whilst aiding to improve the country's ecological status.

MALAYSIAN AGRICULTURAL RESEARCH & DEVELOPMENT INSTITUTE (MARDI) is given the multifaceted issues and components of the agriculture system, research in sustainable agriculture will incorporate R&D projects from multiple disciplines - from science and engineering, to social science and design, and from field to consumer acceptance as the final usage.

SHANDONG ACADEMY OF AGRICULTURAL SCIENCES (SAAS), a comprehensive, non-

profit research organization of agricultural sciences and technology directly subordinate to Shandong Provincial Government with a history of 110 years. Its Headquarter is located at No.202 Gongyabei Road, Jinan 250100, Shandong, P.R.China.

MARDI, ACI & SAAS, set China to be the prime in agriculture research and development (R&D) activities in the country from three giant. The trio signed an extension project on the R&D of edible fungus cultivation, bacteriophage. The **bacteriophage** technology uses microbe virus to infect and kill the disease causing bacteria. This can be applied as a biocide in agriculture and forestry and help to reduce food safety risks and loss suffered by farmers due to bacteria outbreaks. A number of successful trials of phage-based bio pesticide from 3 in 1 bio-fertilizer for controlling bacterial wilt disease in fruit like tomato, chilies & dragon fruit were done.

The MoU were signed by chairman of the board of directors of ACI, Dato' Tony Peng Shih Hao, SAAS was represented by its director and deputy head, Professor Guo, Director General of MARDI, Dato' Dr Sharif Haron and witnessed by the Minister of Agriculture & Agro-based Industry Malaysia, YB Dato' Sri Ismail Sabri Bin Yaakob and Secretary General Ministry of Agriculture & Agro-based Industry Malaysia, YBhg. Datuk Mohd. Hashim Bin Abdullah.

With its green technology attributes, bacteriophage is able to replace chemical pesticides. It can be produced at a relatively low cost, is environmental friendly, non-hazardous and has the potential to increase agriculture exports and forest farming produce in Malaysia.

The enterprises will indirectly support the current efforts made by ACI & MARDI in expanding the country's food safety programs through several research projects that have been initiated, among them the increase in rice production, industrial competitiveness, improving competencies in the poultry industry, and also higher productivity and greater sustainability of the agriculture industry.

These initiatives will be funded by the long term research grant scheme. The research collaboration also benefits joint training of staff and researchers of China & Malaysia, knowledge exchange as well as co-publishing of SMART Fertilizer (disease control).

The methodology of escalation the country's agricultural sector to the next level was to invest in high-technology R&D activities to spur its development and ensure its sustainability. The development in the agricultural sector could help the country reduce its dependency on importing food and save on foreign exchange flows.

MARDI in the lens



● Yang Dipertua Negeri Sarawak, His Excellency Tun Datuk Patinggi Abang Haji Muhammad Salahuddin sucking Stingless Bee Honey directly from the beehive during his visit to Langkawi.

Seed management: Key to the future of agriculture

Without seeds there can be no agriculture and within the culture of modern agriculture, a well defined seed policy can make the difference between prosperity and decimation.

Seeds are one of the six pillars for food production especially for staple food crops of the annual cropping types. Seeds are also one of the means of establishing a new crop each season and they determine the genetic potential of the crop that is grown on a particular location.

Seeds also provide the vehicle to transfer new genotypes (varieties) from research institutions into the farming community. Despite this fundamental role in crop production, seeds also have some special attributes arising from their biological properties, which make them a difficult product to handle.

This is not only a result of physiology and genetics, which are of general application, but there are also strong economic and policy dimensions that are specific to crops, countries and regions.

Modern agriculture relies on a few chosen species being grown on large scale farms almost to the exclusion of less popular crops or variations of a crop. Obviously this practice is not conducive for enhancing biodiversity.

Biodiversity is accepted as one of the reasons why life has flourished on earth and persistent suppression of biodiversity

in our food and commercial crops may have yet untold consequences on the environment and our own existence.

One of the key to future agriculture success lies in promoting new diversity and

ated by Government agencies. New entrants should be treated as an equal and where possible, open access or lease of existing processing facilities should be considered.

State-operated agricultural research agencies are essentially gatekeepers to diversity and in many cases they promote very few varieties in order to achieve their Key Performance Indicators. However, a successful seed policy must have a mechanism that allows for more varieties to be made available to the market.

There are various ways in which this can be done, such as by offering licences to multiply new varieties.

Public sector breeding can be the stimulus for the emergence of a new seed industry and in order to successfully assume this role, they must obtain new varieties of seeds to strengthen their portfolio.

However, an equitable policy for accessing these varieties must be devised and, in the context of plant variety protection, a royalty payment may also be expected.

Regional cooperation between national research agencies should be an important dimension in the Asean seed policy. For this reason, cooperation in variety testing would be a step forward.

An effective seed policy is not just about preserving biodiversity and providing variety to the market, it actually plays a key role in ensuring food security for the region, if not individual countries.



Diversity of Malaysian durian: Have you spotted any of them?

By: **H. Azman, A.K. Faewati**
 Mechanisation and Automation Research
 Centre, MARDI
 Serdang, Selangor, Malaysia

Durian is well known in South East Asia but even as late as the end of the last century, it was popular only among the Malays who cultivated the fruit for their own consumption.

There are 29 species which have been identified and they are believed to originate from Malaysia but is now widely distributed throughout Asia from Sri Lanka to Myanmar, Thailand, Borneo, Indonesia, the Philippines and Madagascar. In Malaysia, 24 species have been identified and *Durio zibethinus* is the main cultivated species.

The durian flowering season varies from state to state but it peaks in July and August. Perak enjoys two peak seasons and Pahang appears to be capable of continuous production except in April, May and June.

Durian fruits fall once ripened and depending on the varieties, this occurs 117 to 145 days after flower initiation.

Commercially there are 5 varieties that make up most of the market and they are all clones or hybrids. These include D2, D24, D99, D145 and MDUR78, 79 and 88 hybrids. Recently, D197 or Mousang King has become a favourite in the market and fetches some of the best prices.

Traditionally, there are a few well known varieties e.g. D2 or Dato' Nina which originated from Melaka and the trees tend to be medium large and erect in form. It flowers regularly but does not provide high yield. Among the advantages of this clone is its

Durian season in various states of Malaysia

State	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Johor												
Kedah												
Kelantan												
Melaka												
Ng. Sembilan												
Pahang												
Perak												
Perlis												
Pulau Pinang												
Sabah												
Sarawak												
Selangor												
Terengganu												

Source: FAMA (2005)

tolerance to *Phytophthora* stem canker.

The fruits are medium to large ranging from 1.3 - 1.8 kg in weight. Although the flesh is thick and the seeds are small, D2 durians are hard to split open. The fruit is good, however, it is not widely grown.

D24 originates from Bukit Merah in Perak and gives a high yield between 100 and 150 fruits/ tree/ season. It is one of the leading commercial clones in Malaysia. It flowers regularly and is popular among the growers.

Its maximum productivity is between 10 and 15 years. The fruits range from 1.0 - 1.8 kg with thick, light yellow, firm, creamy and smooth flesh. The fruit flavour is described as sweet and nutty with a slight bitter aftertaste.

Care must be taken by the grower to prevent and control stem canker which can cause uneven ripening where parts of the flesh remains hard (*mangkar*). Drought can also contribute to uneven ripening.

D99 is another popular clone originating from Thailand. It is widely planted due

to consistency in fruiting with 'off season' fruiting habits and early season harvest. The D99 is also a good polliniser for D24.

This is a particularly a hardy clone which is tolerant to stem canker and drought while still producing good fruits. The fruits are small ranging from 1.0 - 1.5 kg. Despite the size, this is still a favourite among fans due to the thicker bright orangey-yellow flesh. Fruit flavour is classified as mild and has a fine texture.

Durian Hijau or D145 originated from

Malaysian durian species



Durio dulcis



Durio carinatus



Durio singaporensis var jeranguensis



Durio pinangianus



Durio oblongus



Durio lowianus



Durio kutejensis



Durio oxleyanus

MARDI's clones durians

“In the early 1990s MARDI sought to improve the D24 and came up with the MDUR 78, MDUR 79 and MDUR88 hybrids which offer fruit quality that is comparable to D24 but offers tolerance to stem canker, a major problem with the original clone.”



MDUR 78



MDUR 79



MDUR 88

Beserah, Pahang. The tree is medium-large and susceptible to dry conditions as well as stem canker. Although there is consistency in fruiting, it is heavy bearing when in season and the fruits are easy to split.

The aril is of medium thickness, bright yellow, fine textured and tastes sweet and nutty with good aroma.

In the early 1990s MARDI sought to improve the D24 and came up with the MDUR 78, MDUR 79 and MDUR88 hybrids which offer fruit quality that is comparable to D24 but offers tolerance to stem canker, a major problem with the original clone.

These hybrid varieties also offer longer storage life, lasting between 70 and 80 hours after fruit drop before they begin splitting.

Interestingly, two wild species continue to enjoy market popularity. They are Durian Kuning or Durian Otak Udang Galah, scientifically identified as *Durio graveolens*. The aril can come in a wide range of colours from crimson red to white and is sweet with a cheesy texture. Some describe the taste like roasted almonds.

Durian Sukang or *Durio oxleyanus* grows on huge trees that fruit later than *D. zibethinus* and *D. graveolens*. Unlike other species which have five locules, this species only has four and the aril is corn yellow, smooth and sweet with strong fragrance. The season is usually

in September in Brunei.

MARDI continues to improve on the available clones through hybridisation and clonal selection with a second F₁ hybrid population being introduced with a wider set of parents. This time six local and four Thai clones were used in the hybridisation. The local clones were D24, D10, D38, D52, MDUR88 and KK11 while the Thai parents were D98, D99, D113 and Cemposi.

The 10 selected parents have wide genetic range due to their diverse origins and they were selected for high consistent yields, good fruit quality and special characters such as unique taste.

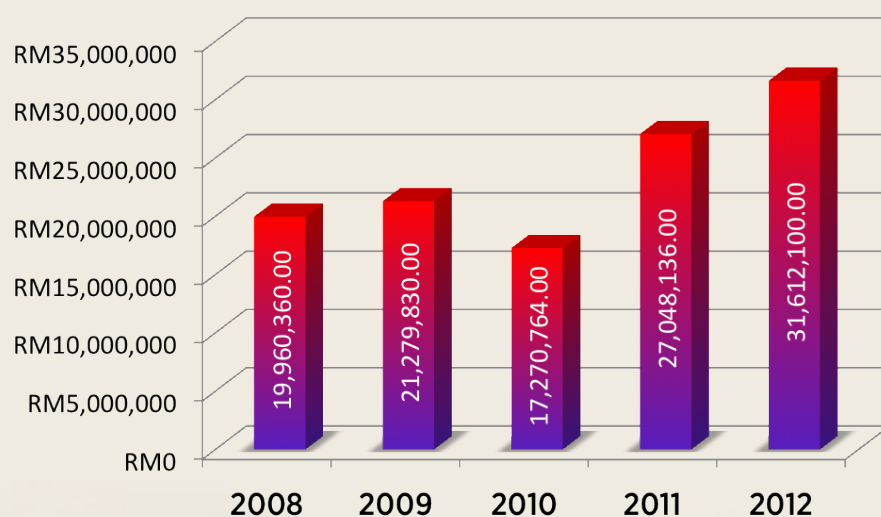
Based on initial fruit quality assessments, 13 of these hybrids showed commercial potential and were put in replicated trials in Bukit Tangga in October 2000, Kuala Kangsar in July 2002 and Jelebu in November 2003.

Assessment continues on these hybrids.

The future of the durian industry, especially in the export market, relies on packaging technology and this is now more than adequate and the previous decline in interest for the fruit seems to have made a reversal.

Further research into the potential of durians, especially in the development of processed products and enhanced global marketing will help it to conquer new markets and make new friends.

MALAYSIAN DURIAN EXPORT



Source: FAMA (2013)



Durio carinatus



Durio griffithii



Durio graveolens



Durio testudinarum



High antioxidant drink from *Citrus microcarpa* ('Limau kasturi') by-product



● Dr. Suri and his research team

By: **Dr. Suri Roowi**
 Food Technology Research
 Centre, MARDI.

Background

The health benefits of citrus have been known for centuries. In 1747, James Lind, a naval surgeon noted that crewmen with scurvy made a full recovery after eating oranges and lemons. Several studies showed that citrus fruits appeared to be associated with lower risk of colorectal, esophageal and stomach cancer as well as stroke. Citrus fruits are also associated with improved blood lipid profile and survival of the elderly. Health benefits of citrus are attributed to the richness of polyphenols that are able

to counteract oxidative stress and hence reduces risk for certain chronic diseases.

Calamansi or 'limau kasturi' or *Citrus microcarpa* is a small citrus fruit with loose skin and a sweet musky smell. Although this citrus fruit is regularly used with black tea and ice, to date not many studies have been done on the development of health drink from calamansi. Phloretin-G is one of the beneficial compounds in calamansi and has high Trolox Equivalent Antioxidant Ratio (TEAR) value at 3.4, which is higher than epigallocatechin-gallate, potent antioxidant compound in green tea. Phloretin-G is also stable at high temperature and high pressure. **KASTURI DRINK** is a newly developed high phloretin-G drink (developed from calamansi by products.

Description of technology

The identification of phloretin-G in calamansi was developed using High Profile Liquid Chromatography-Mass Spectrometry technology (HPLC-MS). The antioxidant activity of phloretin-G was accessed using HPLC with on-line antioxidant assay. This technique requires a radical scavenging compound called 2,2'-azino-bis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS). The newly developed **KASTURI DRINK** is made by fermenting selected parts of calamansi that contain high amount of phloretin-G that with edible microorganism.

KASTURI DRINK still has high level of phloretin-G in even



● **KASTURI DRINK** - made from calamansi by-product (*Citrus microcarpa*)

after 18 months of storage. Its quality was tested scientifically and underwent sensory evaluation by selected panellist with overall acceptability of 9.0. Apart from that, **KASTURI DRINK** also contains vitexin-2-O-rhamnoside which has been used as an anti-hypertensive agent in the U.S.A. Vitexin and its glycosylated forms exist in *Cratageus oxycantha* (hawthorn berry) is also sold commercially as anti-ischaemic and cardiogenic agent. In addition, **KASTURI DRINK** contains fibre from selected sources which enhances its benefit.

Novelty of innovativeness

Newly discovered phloretin-G in calamansi is a natural antioxidant that can be used to develop high value antioxidant product such as **KASTURI DRINK**. It is a cheaper substitute for several types of antioxidants are being marketed in the world. to other powerful antioxidants such as green tea which is a powerful antioxidant in the world market, and is

known for their potent antioxidant properties. It is also a substitute for mangosteen which is rich in xanthone, which is a fat soluble antioxidant compound, but, high intake of fat soluble antioxidant compound may have negative effect. With the newly developed enzyme technology, phloretin-G content in developed product can be increased. The product developed will be at par or even better than any of the established antioxidant products in the market. This product will also benefit general public to maintain good health and help functional food industries to develop high quality drink

Economic impact

The functional food industry, consisting of food, beverage and supplement sectors, is one of several areas of food industry in Malaysia that are experiencing fast growth over the recent years. The newly developed product - **KASTURI DRINK** may be able to substitute similar imported functional foods in Malaysia and hence will reduce import of functional foods. **KASTURI DRINK** can also serve as good alternative downstream product for local citrus industry.

Potential users

Consumer's interest in functional foods has increased since late twentieth century as people's interest as their awareness in achieving and maintaining good health improved. The newly developed **KASTURI DRINK** may satisfy the demand of health conscious consumers.

ACHIEVEMENTS

1. Gold Medal (International Invention, Innovation and Technology Exhibition (ITEX-2013)
2. Malaysian Innovative Product Award (International Invention, Innovation and Technology Exhibition ITEX 2103)
3. Best Invention (ITEX 2013) for Research Institutes and Organization (2013)
4. Gold Medal (Malaysian International Technology Expo - 2013)
5. Gold Medal (MARDI Science and Technology Exhibition MSTE 2012)
6. Innovative Product Award (MARDI Science and Technology Exhibition- MSTE 2012)
7. Intellectual Property Right (Technology to produce High Phloretin-G drink -4 Feb. 2013, with the IP no. TS 2013/02/0007)
8. MARDI BEST Article published (2011)-J. Agric. Food Chem. 59(22):12217-12225
9. Gold Medal (BioInnovation -BioINNO-Awards)- 2013
10. Gold Medal (International Trade Fair 'Ideas-Inventions-New Products' (IENA-Germany) - 2013



The first Malaysian watermelon hybrid



INVENTOR : Bahari Masaruddin, Zainal Abidin Idris, Mohd Rafii Yusop and Ghizan Saleh
R&D TEAM : Norzila Ghazalli, Muhamad Khalid and Othman Ismail

New watermelon hybrid variety: SUPERHORT-RED

SUPERHORT-RED is a first local watermelon hybrid variety developed by crossing inbred lines 'NDGS-21' with 'GS-10'. It is early maturity, harvest about 30 days after flowering or 70 days after transplanting.

The fruit is elongate, light green and has dark green stripes on its surface and the flesh colour is dark red. The central soluble solid content is 12%,

and with crisp and more juice.

The average fruit weight is 2.8 kg and mean yield is 30 t/ha. The fruit has good quality and highly suitable for storage and transportation. This variety has moderate tolerant to fusarium wilt disease.

BEFORE THIS HYBRID:

- Farmers rely on importation of watermelon hybrids seed
- Seeds cost rise every year
- Most of the hybrids not well adapted in all environments
- Low yield and susceptible to major diseases

Young Agropreneur Programme to attract new generation of farmers

By : **Mohd Arif bin Adenan**
Manager, Young Agropreneur
Unit & National Blue Ocean
Strategy (NBOS)

The National AgroFood Policy, which aims to make Malaysia achieve Self Sustenance Level of food production requires the drive and spirit of innovation that youth can offer, but right now their participation in agriculture is worryingly low at 14 per cent.

The Young Agropreneur Programme is designed to attract young farmers by offering them competitive career path

and a minimum income stream of RM5,000 per month through special packages drawn up under the programme.

All Malaywian aged between 18 and 40 can apply to take part in this innovative programme which require neither guarantor nor collateral.

The programme is not limited to individuals, companies owned by youth, co-operatives and associations which have been involved in agriculture are encouraged to apply.

Application forms are available on the Ministry of Agriculture website, a special facebook page 'Unit Agropreneur Muda', all agriculture department offices and all 12 agencies under the ministry.

The forms can be submitted to any district agriculture office or directly to Unit Agropreneur Muda in Putrajaya for evaluation.

Offers for courses or advanced mentoring programme will be made to interested participants after the evaluation process.

The Young Agropreneur programme comprise five components; Free training and mentoring, friendly financing, minimum income of RM5,000 per month, focus on high-value agriculture and application of modern technology. The programme covers 20 main agriculture sectors.

The most popular activity are chili and rockmelon fertigation leads the way with 298 young farmers registering interest.

Next up is stingless bee cultivation with 135 registered farmers and a close second is Honey Bee cultivation with 130 participants and followed by livestock farming which has attracted 107 new farmers.

Aquaculture in the form of fish cultivation has attracted 44 registrations.

So far, 876 youth has registered and they are undergoing various phases of the programme from attending courses to working on their own agriculture project.

These farmers would undergo periodic training organised by Unit Agropreneur Muda, the Ministry of

Agriculture to improve their chance for success.

Those who have passed the courses may even get land under an initiative to identify and make productive idle land owned by government agencies. The ministry is collaborating under the National Blue Ocean Strategy to find and activate these lands for possible group farming.

Interested young farmers can also contact any district land office for help in identifying idel land in their vicinity.

So far six projects under the fishery sub sector is up and running as contract farms under a lead company. In Pasir Salak 10 participants are taking part in Patin and Tilapia farming in Sungai Perak.

A large scale honey bee project is underway in Pekan, Pahang while stingless bee honey production is on the way in Kampung Perik, Kuala Nerang.

Bera in Pahang is home to cattle production with 27 participants, this town has been named as the livestock hub for the East Coast Economic Region (ECER) while Johor is playing host to pineapple growing for young farmers on idle state government land.



Musseling into aquaculture

Bivalve projected to contribute 140,000 tonnes to national aquaculture production by 2020

By : **Mazuki Hashim**
Department of Fisheries, Putrajaya.

"Mussel culture is still considered a new venture and still faces resistance on investment because value added activity on mussel is still limited to a few products and the industry does not see the export potential of mussels."

Mussel has the potential to rival cockle as the main contributor to the country's bivalve production if hurdles of production technology and marketing can be overcome.

The Fisheries Department is carrying out research into environmentally intensive production and harvesting system as well as refinement of the culture techniques to ensure production of more consistent size range to allow for improved downstream processing and marketability of mussels.

Adoption of Best Practice, Standards and Guidelines for mussel farming recently established in Europe and new technology for grading, handling, transportation, conditioning and storage of mussels will play key roles in achieving our production targets.

A major barrier to market expansion is consumer experience of gastro-enteritis after consuming shellfish, therefore adequate measures to address the issue of contamination must also be put in place.

The government, through legislation, must force the shellfish industry to adopt sanitation practices such as depuration and improve the quality of cultured shellfish.

Mussel culture is still considered a new venture and still faces resistance on investment because value added activity on mussel is still limited to a few products and the industry does not see the export potential of mussels.

Finally, mussel farming does not have an environmentally friendly image, the rafts and long lines are not picturesque and not suitable to agro-tourism concepts promoted by the country.

To overcome the issue of presentability and

demands of agro-tourism, the Department of Fisheries carried out a pilot project in early 2011 located in Telok Jawa, Johor Bahru on a newly identified mussels farming technology from Norway, the SmartFarm.

The pilot project consist six on-growing units of HDPE pipelines with attached netting materials and it managed to provide the aesthetic solution, as the pipelines are less visible when compared to using traditional buoys or rafts.

With the expected yield of 25 tonnes per each of 126 meter long line- three to four times higher than existing traditional culture system, it has prompted a private company, Hannan Seafarmer Sdn. Bhd. To invest in a commercial scale mussel farm in an area of 10 hectares in the Straits of Johor.

By February 2013 the company successfully installed 51 units of Smart Farm-Units at the site and established a basic processing facility adjacent to the farm with the capability for processing about 11,000 tonnes of fresh mussel annually.

With export demand, especially from Singapore, growing steadily, the company has decided to acquire a specialized work-boat integrated with a harvesting machine, further perfecting the Norwegian mussel rearing technology.

With the above developments, the aim of the government to build up large scale mussel farming has been met.



Contract Farming: Matching production with market demand



“ Under the programme, Farmers enjoy market guarantee for crops which conforms to the type, variety, quality, grade, packaging and production ”

By: **Hadih Mohd Khairi**
Senior Director Contract Farming,
Federal Agricultural & Marketing
Authority (FAMA)

Matching agricultural production to market demand is not only a good way of reducing wastage but is also a way of improving farming returns, especially for small and medium scale operations.

The Federal Agriculture Marketing Authority's Contract Farming Programme is a High Impact Project introduced to assist small and medium scale agricultural entrepreneurs by providing guaranteed market for their agricultural produce and ensuring the remunerative returns.

This programme was also intended for matching production of agricultural produce with market demand to increase the income of producers.

It also expands production of fruits and vegetables, ensure that agricultural produce is of high quality, meets market needs and improve technology transfer along the supply chain.

Under the programme, Farmers enjoy market guarantee for crops which conforms to the type, variety, quality, grade, pack-

aging and production schedule as specified and mutually agreed upon.

The implementation of this programme takes into account all related aspects along the agri-produce supply chain such as support services, post harvest facilities which include collecting centres and grading centres.

In 2012 Contract Farming Programme targeted to develop 7,000 hectares of crop area and involving 4,500 participants.

Until the end of December 2012 contract farming had been successful in developing total crop area of 7,128 hectares (101.8 percent) involving 4,219 participants (93.8 percent).

MAHA 2012

At MAHA Exhibition 2012, FAMA through the Contract Farming implemented a program to support Apollo Melon and Rock Melon marketing direct from the farm.

This was in line with the tagline used in MAHA – Melons Direct from Farm to MAHA.

The main areas of Apollo Melon cultivation were in the Royal Project Kampung Banggol, Kampung Teliar, Batang Merbau Permanent Food Production Park (Taman Kekal Penghasilan Makanan – TKPM) and Kampung

Jeram Tuli, Pasir Putih. Meanwhile in Perak Apollo Melons were planted in Bagan Datoh and Simpang Pulai.

Program To Increase Supplies from Contract Farming to the Farmers' Market (KUKUH)

In 2012, FAMA implemented the KUKUH programme. This was in line with the fifth focus of the 2012 National Budget 2012- to cushion inflationary pressures and enlighten the lives of the people.

This is achieved by increasing the Contract Farming Programme to ensure sufficient food supply and the produce sold directly to the farmers' markets. The main objectives in the implementation of this program are to:

1. Increase the supply of vegetables and fruits in Farmers' Market through the concept of selling direct the produce from contract farming to farmers market;
2. Cushion the inflationary pressure by offering reasonable prices lower than market prices; and
3. Offer better prices to producers than that offered by wholesalers.

Organic agriculture in Malaysia: Moving beyond Status Quo

By: **A. Sivapragasam and Mohamed Roff**
CABI-SEA and MARDI

THE pivotal agenda for the Malaysian organic agriculture (OA) sector will be to maintain the momentum and move from the fringes into the mainstream agriculture with stronger entrenched Government policy that invariably goes beyond the rhetoric.

Malaysia's OA sector began in the 80s but despite strong initial interests shown by various private and public-sector organizations, the overall growth scenario has been one which is relatively slow compared to the other countries in the Region.

Based on the figures quoted by the Department of Agriculture (DoA 2010), the acreage under organic agriculture has shown increasing trends from 600 ha in 2005 to about 1,540 ha in 2009. This makes up of about 0.01 % of arable land (in 2009).

The farms are small, market is robust but supply is highly unreliable or cautious. The products are mostly vegetables and fruits grown in a small acreage.

There has been pioneering initiatives in rice, oil palm, fish and poultry, however, a significant amount of organic products that are sold in retail shops to hypermarkets continue to be imported.

Like other products, consumer demand determines the growth of organic farming. Currently, there is generally low awareness of organic products especially with regards to their authenticity and thus the reluctance to pay

premium prices.

Meanwhile, at the growers' level, many do not have adequate knowledge on OA; pricing and marketing; pest and disease management, difficulty in keeping records and to meet full criteria for SOM standard.

The high cost for certification by foreign certification bodies is a deterrent. Finally, at the retailers' level, many face inconsistent supplies and are not sure of the product authenticity.

On the global scene, organic farming now takes up more than 31 million hectares (Zehnder et al. 2007, *Annual Review of Entomology*).

The trend is led by the countries in the Oceania Region (11.8 million ha) followed by Europe (6.9 million ha), Latin America (5.8 million ha), North America (2.2 million ha) and Asia (2.9 million ha).

However, this still represents less than 1% of the total agricultural area of these countries.

Zehnder et al. (2007) also reported that the worldwide market for organic products is estimated at USD28 billion (2004 statistics), with the highest growth occurring in the United States, where organic sales grew by USD1.5 billion in 2005 to reach USD12.2 billion.

A steady market growth has been recorded for organically grown food in the past decade in the USA (from 17-20%) and Europe (>25%) as compared to 2-3% for conventional food (Rozhan 2009).

Health concerns have been the major driving force behind the organic sector followed by environmental and social concerns, energy efficiency and to some extent spirituality.

Traceability System developed for durian export to China

By: **Dr. Azmi Man, Azlan Shaari, Hazim Khalid**
MARDI

“The application of a traceability system does not only ensure quality but also enhances the integrity of handling and processing of frozen durian which is fast gaining popularity in China.”

A Traceability System has been developed as an initiative of the Malaysian Agriculture Department to encourage market confidence in the quality and safety of food and agricultural products that we export.

This system forms an important component of the National AgroFood Policy which demands traceability to original source of all food and agricultural products.

The system is now accepted by China and all consignments of frozen durian that is processed by processing

centres accredited by the Agriculture Quarantine Service Inspection of China – AQSIQ can be traced to source, raising market confidence in our quality assurance.

The application of a traceability system does not only ensure quality but also enhances the integrity of handling and processing of frozen durian which is fast gaining popularity in China.

A process flow for traceability for frozen durian was developed. The process involves four stages of traceability starting from the farm or processing/ storage facility before proceeding to the domestic logistic process. The third stage scrutinises the actual export process of transferring the product from a Malaysian port to the receiving port in China and finally the traceability system looks at activities that take place in the importing country.

This traceability system will help fulfil Agriculture and Agro-Based Industries Minister, Dato' Sri Ismail Sabri Yaacob who wants to see an increase in exports of fruits, especially durian and papaya to China.

Negotiations are being held with

the relevant authorities in China so that more fresh Malaysian fresh fruits can be brought into the country.

Speaking to reporters after opening the Penang state level 'Road to MAHA' programme on February 15, the minister said; "Currently, we only export frozen fruits there due to the strict regulations to export fruits into China".

Despite the increase in demand for Malaysian durians and papaya in China, the supply for fresh fruits are not sufficient.

Ismail said the interest from China is very real and they had sent representatives to do research and inspect our fruit orchards, to see whether the farmers adhere to their standards.

Apart from government negotiations and promotional efforts in China, orchard owners must also improve their orchard management and adopt technology and good agricultural practices to increase the production of durians.

According to trade figures, Malaysia had exported RM1.4 billion in local fruits, with 30 per cent of the amount ending up in China.



Could City farming be the way of the future?

Urban Horticulture, beyond the fad and contributing towards sustainability

Today, 72 per cent of Malaysians live in townships or urban areas and every year 2.4 per cent of the country grows into concrete jungles.

If the current projections hold true, urban poverty will be a major problem and statisticians predict that by the year 2020 between 40 and 45 per cent of our urban dwellers will live in economic hardship.

The rising cost of food is expected to use up between 50 and 70 per cent of their income and this expenditure can be reduced by practicing urban horticulture. If their urban plot is well tended, it can even bring extra income.

Urban horticulture can ensure food security and give them affordable supply of healthy food for the low income group.

MARDI is keen to make urban horticulture a way of life in Malaysia and is organising National Urban Horticulture Conference 2014 from April 15 to 17.

Although urban horticulture is new to Malaysia, it has been widely practiced in large cities like London, Hamburg and even our neighbour, Singapore where land is scarce.

To develop urban horticulture in our cities, besides conducting research, we need to initiate joint efforts and cooperation among agencies

and private sectors involved in horticulture and landscape, city and community development authorities, housing developers and policy makers.

Urban landscape is also equally important as it ensures a balanced ecosystem, improve environment and health. Both urban landscape and urban horticulture should be developed concurrently to ensure sustainability of cities. This conference is aimed at addressing issues and challenges and come out with well-planned strategies in initiating and developing urban horticulture in Malaysian townships and cities.

Several areas of discussion have been identified and one of the key areas is the latest in urban horticulture trends and technology as well as on-going research and development.

The conference is also set to identify issues, challenges and approach in developing urban horticulture in Malaysian cities.

Cooperation and understanding between government agencies, private sector, community and individuals interested in urban horticulture and landscape is key in ensuring success, therefore the conference will provide a networking session for all parties.

The conference will be held at the Berjaya Waterfront Hotel in Johor Bahru.



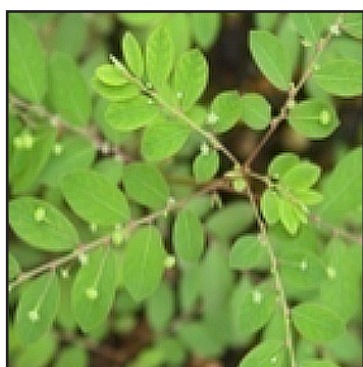
● Future concept of vertical "Dragonfly Urban Farm"
(images via: Vincent Callebaut)

Dukung anak proven as potential cancer cure

Formulation as a multi-targeted natural therapeutic product

By: **Indu Bala Jaganath**

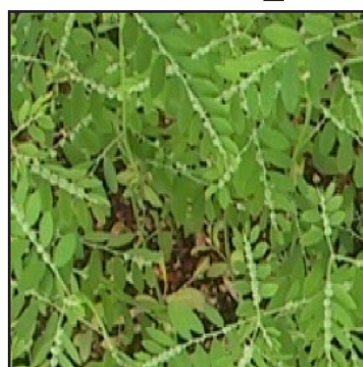
"There are four different species of Dukung anak in Malaysia and in a many cases these species have been misidentified which has resulted in a number of discrepancies and irreproducibility"



● *Phyllanthus watsonii*



● *P. urinaria*



● *P. niruri*



● *P. amarus*

The rich cocktail of phytonutrients from dukung anak has been found to exhibit anti-cancer properties through its effects on the apoptosis pathway in melanoma and prostate cancer cells.

The formulation also produced high anti-viral activity; up to 94% inhibition against dengue virus by down-regulating the synthesis of an important structural protein needed during viral replication.

This formulation was also able to reduce blood serum cholesterol comparable to conventional treatment with statins. Statin which may cause hepatic damage in mice models Dukung anak (*Phyllanthus sp.*) is a weed, and can be seen growing along wastelands, along the roadside and drains. However, in Malay, Chinese and Indian folklore, this herb is treasured for its many healing properties.

It has been nicknamed as the stonebreaker due to its anti-diuretic ability. It has also been employed to treat hepatitis, bacterial infections, diabetes and hypertension.

Although there has been extensive scientific evidence on the different efficacies of this herb, the main drawback is that, just like other herbs, the scientific studies carried out on the herb is very fragmented and sometimes inconclusive.

One of the main reasons behind

this is that the production of health benefiting compounds in Dukung anak is very susceptible to the varying climatic changes and affecting the standardization of the herbs. There are four different species of Dukung anak in Malaysia and in a many cases these species have been misidentified which has resulted in a number of discrepancies and irreproducibility of scientific reports in terms of its chemical constituents and bioactivity.

To bring Dukung anak to the forefront of the herbal industry, it is important that this crop is backed up with comprehensive scientific backings where the potency and the efficacy of this plant are thoroughly validated.

Through a government (MOSTI) grant amounting to RM 1.5 million, a multi-disciplinary mega project entitled "Physiological manipulations to stabilize and/or increase bioactive compounds in *Phyllanthus sp.* for its antiviral and other health related properties" is being done at Biotechnology Research Centre, MARDI utilizing To limit the discrepancies in the efficacy of dukung anak, the first step employed was to botanically characterize the species of dukung anak in Malaysia. Four species of dukung anak i.e *Phyllanthus watsonii*, *P. niruri*, *P. amarus* and *P. urinaria* were identi-

fied. These species were then grown in a standardized manner utilizing consistent amount of irrigation and fertilizer and in a semi controlled environment to limit the effects of environmental factors on the production of phytonutrients.

Further development for dengue and cholesterol reduction

Through its validated multi-targeted intervention, the bioactives from dukung anak formulation has the potential for incorporation into functional foods or for the development of therapeutic remedies.

Many pharmaceutical companies worldwide produce new antiviral and anti-cancer formulations extracted from herbs due to its potential for effective treatment as it targets many cellular and molecular disease pathways making it a more effective therapeutic agent.

This formulation can be especially important in Malaysia as the number of dengue infection has increased drastically in the last few decades, where in 2010, our country has been reported to have more than 40, 000 cases of dengue with more than 50 deaths.

Therefore effective of antiviral drugs to dengue infection is really in great demand.

This formulation was also found to be safe and effective in reducing



● Dukung anak products generated - collaboration with Furley Bioextract Sdn. Bhd.

blood cholesterol comparable that of the commercially used drug, statin. Statins currently constitute a major revenue in the pharmaceutical industry, exceeding US\$25 billion in 2009 (Statins: The World Market 2010-2025).

Due to the side effects of statin (associated with muscle and liver toxicity), there is a huge demand on the search of safe natural plant alternatives for the reduction of blood cholesterol towards better

cardiovascular health and one such product is the *Phyllanthus* formulation derived from this innovation.

Other than the development of a phytonutrient rich cocktail, some novel technologies were also generated through this innovation. A total of four patents were filed in the year 2011-2012. Currently this technology/ innovation is in the process of being licensed out to a local Bionexus Herbal Company, Furley Bioextracts Sdn. Bhd.

Muhyiddin: Food security remains a big challenge

Asean population to hit 786 million by 2050, higher food productivity crucial



• Tan Sri Muhyiddin Yassin accompanied by MOA Minister, Datuk Seri Ismail Sabri and his deputy, Datuk Tajuddin Abdul Rahman visited AMAF exhibition.

Even when we have achieved economic progress and modernisation today, Deputy Prime Minister, Tan Sri Muhyiddin Yassin says the future of global and regional agriculture and food scenario is still uncertain.

He expresses that concerns as to whether we can produce and sustain enough food for everybody remains.

This is particularly worrying given that the United Nations predicts the world's population to breach the 9.5 billion mark by the year 2050. In Asean, total population would increase by more than 30 percent to reach 786 million by the same year.

Muhyiddin was speaking to the

35th Meeting of Asean Ministers on Agriculture and Forestry (35th AMAF) and the 13th Meeting of Asean Plus Three Ministers on Agriculture and Forestry (13th AMAF Plus Three) and The 3rd Asean-India Ministerial Meeting on Agriculture and Forestry (3rd AIMMAF).

"ASEAN would certainly need to continuously work towards generating more food. Hence, our food security framework has to be based on increased productivity and efficiency, in order to produce our own food supply at a sustainable level, taking into account global market openings and liberalisation, as well as increased exports of food from the Asean region.

"In ASEAN, as our income

and standards of living continue to rise, the challenge is not only to produce sufficient food but to be able to produce the so-called "richer foods", such as meat and milk to satisfy ASEAN regional demand.

"Therefore, we, in ASEAN, need to work closely together to drive earnestly the important initiatives set out by our Leaders as reflected in the "Statement on Food Security in the ASEAN Region." Muhyiddin adds Rapid globalisation is also affecting agriculture production, causing agriculture land and land banks to be turned into commercial developments resulting in reduced number of planting acreage, and displacement of workers in the

"In ASEAN, as our income and standards of living continue to rise, the challenge is not only to produce sufficient food but to be able to produce the so-called "richer foods", such as meat and milk to satisfy ASEAN regional demand."

agriculture sector.

"Such trends, if not monitored and supervised with great care, will bring grave repercussions to many member nations, hence ASEAN as a region. He says in the pursuit of global competitiveness we must not leave behind the millions of small farmers and traders whose livelihoods depend on agriculture.

Food security must also be achieved while improving sustainable forest management. ASEAN Member states must reinforce strategies and activities that promote Sustainable Forest Management (SFM).

The adoptions of the ASEAN Criteria and Indicators for Sustainable Management of Tropical Forests is a significant achievement in this direction.

"We should strive with every effort to put in place best practices and meaningful mechanisms to enable effective government supervisions, and mitigate abuses of forest handling by commercial enterprises. Muhyiddin also invited Asean Ministers to consider initiating a common fund dedicated to the development of innovation and R&D activities.

"Perhaps with a common and a greater pool of investment, better

and wider options of R&D outputs and efficient costing would facilitate ASEAN members to choose and apply suitable technologies and methods for their respective countries, and hence leading to higher productivity and competitiveness.

"With stronger and more unified networks of partnerships, the full potential of a prosperous ASEAN community can be realised with greater impact," he concluded.

At the end of the meeting, Asean Agriculture Ministers, under the chairmanship of Malaysia's Agriculture Minister, Dato' Sri Ismail Sabri Yaakob agreed to focus their efforts and resources on the achievement of the identified key deliverables and prioritised measures in order to ensure the realisation of the ASEAN Economic Community (AEC) deliverables in the Food, Agriculture and Forestry sectors by 2015.

The on-going progress made in the implementation of the ASEAN Integrated Food Security (AIFS) Framework and the Strategic Plan of Action on ASEAN Food Security (SPA-FS) 2009-2013 is also notable.

To move forward, we agreed to develop a second phase of SPA-FS to accommodate some changes towards the common goal of long-term food security and reflect the important contribution of the Food, Agriculture and Forestry sectors in the realisation of the ASEAN Community.

The ministers were encouraged by the significant progress made in enhancing the competitiveness of agricultural commodities through the development and implementation of ASEAN best practices, namely Good Agricultural Practices (GAP), Good Aquaculture Practices (GAqP), and Good Animal Husbandry Practices (GAHP). We supported the initiative to establish an ASEAN certification and accreditation mechanism to support the implementation of these best practices.

Agriculture should not be marginalised for developed status

The agricultural sector is one of the key sectors of focus for the country, and to be among the main agenda of the country in world trade.

In our efforts to achieve developed nation status by 2020, the agriculture sector should not be marginalised.

As guarantor of the coun-

try's food security, the sector continues to be strengthened as a competitive business entity. Nevertheless, the agriculture sector needs transformation in

order to confront future challenges and competition.

Efforts to transform the sector is a huge challenge, as it not only involves a change in the style of activities, but also require a shift in mindset of society as a whole.

The stigma that agriculture is an activity of low recoil been etched in the minds of the public.

We have to rid agriculture of this stigma and it should be done through the Department of Agriculture and related agencies. Traditional farming approach should be changed by using the latest technology applications and innovations that are relevant and practical.

I do hope that Mardi will be able to ignite a culture of innovation and creativity not only in our ministry, departments and agencies but also in the public service ecosystems.

MARDI's role in generating technology and innovation is very large and especially significant as a driver of the country's agricultural transformation.

Mardi has many technologies and innovations that contribute to the development of the agriculture sector.

However, there still areas to be explored and room for improvement as the concept of innovation itself is constantly changing to suit the times. Mardi must continue to adapt and evolve to ensure continued development of the agricultural sector.

With proper planning, programs and initiatives, I am confident that Mardi will continue to be the home for innovation and more importantly, I am confident that the innovations can be successfully implemented and can bring great impact on the community and the nation.



• Dr Ali Hamsa accompanied by MOA Secretary General, Datuk Seri Mohd Hashim Abdullah and DG MARDI, Datuk Dr Sharif Haron, launched new hybrid of orchid named after him - Renanthera Tan Sri Ali Hamsa.

"Efforts to transform the sector is a huge challenge, as it not only involves a change in the style of activities, but also require a shift in mindset of society as a whole"