

# Sustainable Practices The Key to Healthy Palm Oil Industry

by Zoe Phoon



Palm oil mill



**Ir. Kumar Subramanian** is currently a council member of IEM for 2013-2016 session and was the Chairperson for Agricultural and Food Engineering Technical Division (AFETD) for 2007-2010 session. He is the Managing Director of SGT Konsult Sdn. Bhd., an engineering consultancy firm dealing with design and implementation of agro-based process plants.

Ir. Kumar has more than 20 years of experience in implementing palm oil mills, kernel crushing plants, bio-gas and biomass power plants, waste water treatment plants and compost plants. He has been involved in palm oil industry since 1993 and been exposed to direct field projects in Malaysia, Indonesia, India, Papua New Guinea, Africa and South America. His published works are mostly related to palm oil plant technology, waste treatment systems guided by green technology solutions. He also serves as an advisory panel member for engineering faculties of University Putra Malaysia (UPM), Universiti Malaysia Perlis (UniMAP) and The University of Nottingham Malaysia Campus. JURUTERA recently speaks to Ir. Kumar on issues related to palm oil industry.

## To protect the palm oil industry, agricultural engineer Ir. Kumar Subramaniam says all those involved should be fully committed to protecting the environment.

Agriculture is one of the country's key economic sectors providing rural employment and palm oil produced from oil palm is among the major contributors to the national economy.

However, oil palm cultivation gives rise to some environmental concerns. In rural areas, for instance, rivers are often contaminated with chemicals from agricultural activities. One of the often-asked questions is whether small-scale farmers or big planters have done enough to prevent surface run-off arising from chemical fertilisers and herbicides applications, to the adjacent waterways.

According to Ir. Kumar Subramaniam, farmers and planters can do more to address the actual problem of surface run-off as incidents of water contamination and severe water source pollutions are still issues that need to be overcome.

"A lot needs to be done. Education for the farmers is inadequate. Knowledge on the negative effects of improper applications of chemical fertilisers needs to be improved. Control measures to carry out sustainable agriculture activities to improve production and protect the environment need to be emphasised," said Ir. Kumar.

He said the run-off may end up in the sea or a water catchment area. When this happens, water quality will be seriously affected and the water will not be fit for human consumption downstream. It will also affect coral areas off the coast. With the increase in aquaculture activities in the country, water quality has become a key aspect for the growth of the industry.

Ir. Kumar noted that government agencies such as the Department of Agriculture and the Department of Irrigation & Drainage do provide technical consultancy services but the problem is the lack of awareness and the dissemination of information to farmers, in particular, the cash crop growers with oil palm estates of less than 20 acres.

On the other hand, big plantation companies which own at least a few thousand acres each, have their standard operating procedures (SOPs) for dealing with

surface run-off and water contamination. In addition to the SOPs, they also have to comply with the Round table on Sustainable Palm Oil (RSPO) principles and criteria relating to good agricultural production practices as well as waste management such as zero burning at the estates and methane capture at the palm oil mills.

### RSPO PRINCIPLES AND CRITERIA

Ir. Kumar said the main objective of RSPO is sustainable palm oil production. The RSPO principles and criteria are summarised and listed below:

- Principle 1: Commitment to transparency – Criteria 1.1 and 1.2 touch on providing adequate information for decision making and public assessment.
- Principle 2: Compliance with applicable laws and regulations – Criteria 2.1 to 2.3 touch on compliance with local, national and international laws and regulations as well as on right on use the land.
- Principle 3: Commitment to long-term economic and financial viability – Criterion 3.1 touches on management plan to economic and financial viability.
- Principle 4: Use of appropriate best practices by growers and millers – Criteria 4.1 to 4.8 touch on the operating procedures to maintain soil fertility, minimise soil erosion, maintain quality of surface and ground water, control of pests, diseases, weeds and the proper use of agrochemicals that ensure the health and safety of all staff, workers, smallholders and contractors.
- Principle 5: Environmental responsibility and conservation of natural resources and biodiversity – Criteria 5.1 to 5.2 touch on action plans by plantation and mill management that mitigate the negative impacts on endangered species. Criteria 5.3 to 5.6 touch on reducing wastes, recycling wastes, re-using waste and disposing waste in a responsible manner including reduction of pollution and greenhouse gases emissions and the conversion of the wastes into renewable energy.



*Biogas plant*



- Principle 6: Responsible consideration of employees and of individuals and communities affected by growers and mills – Criteria 6.1 to 6.6 touch on plantation and mill management, on communication and consultation, on complaints and grievances, on compensation and others.
- Principle 7: Responsible development of new plantings – Criteria 7.1 to 7.7 touch on social and environmental impact assessment studies, on proper acquisitions of suitable lands, on zero burning in land clearing, etc.
- Principle 8: Commitment to continuous improvement in key areas of activity – Criterion 8.1 calls on the growers and millers to regularly monitor and review their activities for continuous improvement in key operations.

So, unlike the big plantation companies which already have stringent systems in place to protect surface run-off and provide sustainable cultivation, it is the smallholders who need greater exposure and to be made more aware of the impact of agricultural activities on water quality, said Ir Kumar.

In terms of education, he said the Malaysian Palm Oil Board (MPOB) has come up with many programmes for smallholders but such programmes need to be enhanced and must reach the target groups.

He suggested more information dissemination through radio and TV programmes and articles in newspapers to the small farmers.

He said what big plantation companies have been doing can be easily measured, with increased output and much less pollution incidents recorded. For example, they will consider the various RSPO criteria and guidelines before applying fertilisers to oil palms. However, smallholders will not carry out the activities with similar stringent guidelines. It is also additional cost to smallholders in the beginning.

The RSPO organisation is solely for palm oil producers. When the smallholders carry out planting activities with proper RSPO guidelines, clean water and less pollution can be achieved in a sustainable manner.

Under the RSPO as summarised earlier, he said big plantation companies are subject to required standards in waste management methods and discharge. As a result,

environmental protection has been enhanced for sure. For example, 10 years ago, the palm oil mill effluent (POME) final discharge quality was 100ppm (parts per million) for BOD (Biological Oxygen Demand). Today, it is below 20ppm and there is no direct discharge allowed into the water course.

The final treated effluent is to be used for land irrigation, to reduce the volume of discharge to water course and reducing BOD impacts on water quality, he said, crediting the Department of Environment (DOE) for coming up with farsighted

environment protection policies.

“In a nutshell, the waste treatment methods have improved a lot and protection of the environment is

**“Maintaining good agricultural practices together with good engineering practices are key factors that will ensure water resources and water quality are maintained or enhanced.”**

**by Ir. Kumar Subramanian**

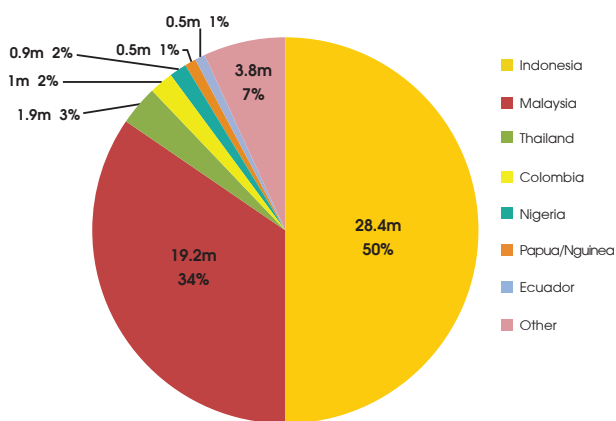


Floating palm oil mill



Press and digester

**Palm Oil Production 2013 - Tonnes**



Data: oil world March 2014 database

**Indonesia & Malaysia = 84% market share**

being given top priority. Biological/microbes methods are being used in waste water management, methane gas enhancement and the sulphur removal treatment process. This shows the commitment from the industry," he added.

He said smallholders should be encouraged and given incentives to implement the RSPO principles and criteria in order for oil palm plantation activities to be carried out on a long-term sustainability basis. Otherwise, the entire production chain will be affected as the RSPO guidelines start from land clearing itself (RSPO Principle 7) until delivery of final product.

"The other area of concern is open burning as practised by the less educated sector of the industry. This largely contributes to the annual haze phenomenon in this region. The blame game will not help the situation but good education and exposure on the ground, provided to the small section of the non-complying members, will help greatly. Losses are great due to haze but we shall discuss this at another forum," Ir. Kumar added.

**USE OF BIOMASS/BIOGAS FOR POWER GENERATION**

Commenting on the utilisation of biomass and biogas for power generation, Ir. Kumar said the biogas/biomass energy sector has emerged as one of the top sectors benefiting from RSPO. Many companies have ventured into generation of electrical power from biomass.

The recent focus in the industry is on biogas capture and utilisation. The captured biogas is used as boiler fuel, replacing mesocarp fibres and kernel shells, which can be sold as industrial solid fuels.

The captured biogas can also be used in gas engines and gas turbines for electrical power generation. A recent practice is to add the EFB (empty fruit bunch) biomass from palm oil mills to the biogas plant to produce more methane, resulting in increased biogas production. The remainder of the EFB, upon completion of the process, is then transferred to the plantations as a bio-organic soil enhancer.

Ir. Kumar said there is an increase in the number of biogas/biomass plants in Malaysia, Indonesia and Thailand. By 2018, all palm oil mills in Malaysia must have the methane gas capture system and the boiler emission control system in place to meet the emission standards set by the DOE. The RSPO is also encouraging this initiative.

There is a requirement for plantation companies selling palm oil on the world market, to be verified and certified that they have complied with the RSPO requirements. RSPO-certified crude palm oil has access to the US and EU markets and can fetch a premium price. During any oil glut situation, certified products are given top priority for commodity transaction, which is surely an advantage in the competitive market.

Meanwhile, there is limited new land for oil palm cultivation, said Ir. Kumar. In the peninsula, a strong demand for new townshipsh as made it necessary to convert plantation land into land for new housing schemes; this has pushed land cost up sharply. In Sabah and Sarawak, the impact is not as great yet but the cost of agricultural area has gone up very sharply too.

He said Sarawak still has a vast landbank but the State government has put a stop to converting land for plantations, as per the latest regulations. There is a standard land development scheme under Sarawak's Land Custody and Development Authority (Pelita) with a stake holding of 60:30:10 (Investor: Natives: Pelita) system being enforced in line with RSPO Principles 5 and 7, specifically for oil palm plantation cultivation.

The RSPO Annex on Land Acquisition follows the international guidelines under ILO Convention 169 (1989) on Indigenous and Tribal Peoples (Articles 13-19). This pertains to respecting and safe guarding rights to lands and natural resources traditionally occupied and used, respecting customs of inheritance, no forced removals and compensation for loss and injury.

## BACKUP PLANS TO UP CPO PRODUCTION

"When we lose out on the total planted hectareage, production will decrease and so will CPO output. However, the industry is looking into various aspects to make up for the loss of plantation areas via biotechnological approaches. One approach being introduced is the use of better oil palm clones which produce higher yield per hectare, of up to 45 metric tons per hectare

compared to 30 metric tons per hectare previously," said Ir. Kumaron the backup plans to increase CPO production.

"Many big plantation companies including Felda, Sime Darby and United Plantations are already planting new oil palm clones that will increase palm oil yield and crop quality."

He added: "Malaysia definitely has backup plans, including planting new oil palm clones and adopting methodologies such as the application of biomass organic fertilisers to improve soil conditions to absorb chemical fertilisers with improved efficiency. Replanting has been carried out for many cycles now in Malaysia and therefore soil conditions need to be enhanced to improve yield.

"Unfortunately, we have lost our status as the No. 1 CPO producer to Indonesia since 2013. In 2007, Malaysia produced about 16 million tons of CPO while Indonesia produced about 14 million tons. In 2013, Indonesia produced about 22 million tons of CPO while Malaysia produced about 19 million tons. Do take note of the increased output from our country despite losing the top producer status to Indonesia.

"To counter the loss of the status and the lack of land to operate big plantations at home, our companies are also expanding their land bank overseas in Indonesia, Papua New Guinea and Africa."

Asked to comment, as an agricultural engineer, on how significant the skills equipped are able to solve water quality and waste issues in upstream agricultural activities, Ir. Kumar said skills are "inadequate" and that graduates need to be given greater exposure to the importance of clean water and preserving water resources. To deal with the changes in climate and operating conditions, the engineers will have to try and acquire more knowledge on managing the situation and being sustainable.

"Maintaining water quality is a very important factor in operating agricultural activities. Agricultural engineers should have in-depth knowledge of water quality, waste management and preserving water resources with the required quality,"



Reactor of biogas

said Ir. Kumar. "Maintaining good agricultural practices, together with good engineering practices, are key factors that will ensure water resources and water quality are maintained or enhanced."

He said more must be done to understand the bigger picture of water resources for humans, industry use and agriculture activities. Raw water needs to be treated for specific consumption requirements and this will involve raw water treatment plants and associated rising operational cost factors. A clean water source will help avoid the high cost of treatment plants and operations and in turn, will benefit the entire consumer sector in the loop.

He added that the recent dry season in Sabah had forced palm oil mill operators to buy water at a very high cost from other sources for operational purposes. In the long run, this will eventually increase their production cost on a non-sustainable basis due to low current CPO prices. Mill owners should implement methods to preserve water resources and water quality available in their area to overcome the dry season and to protect the environment in total.

## POTENTIAL OF BIOMASS/BIOGAS ENERGY SECTOR

On the present position and the potential of Malaysia's biogas/biomass sector, Ir. Kumar said POME (palm oil mill effluent) and EFB (empty fruit bunch) biomass are considered as mill waste water and mill waste products, respectively. Lately, these liquid and solid wastes from the mill have been redefined as by-products. Today, methane (from the effluent treatment) and EFB biomass are being used to produce electricity ranging from one megawatt to 4.0 megawatts depending on the size of the palm oil mill.

The by-product of kernel shells, which comes with high calorific value, is being sold on the open market as solid fuel at prices from RM170 per ton to RM200 per ton. International demand for such solid biomass fuel is great and there is increasing demand from countries like China, Korea, Japan and India. Export of long fibre from EFB and bio-organic fertilisers is also increasing due to high demand from overseas. Domestically, there are ready buyers for excess mesocarp fibre at very attractive prices.

However, the growth of the Malaysian biogas/biomass energy sector is slow compared to that of Thailand and Indonesia due to issues related to policy, demand, tariff rate and logistics.

In view of the huge potential of biogas/biomass, Ir. Kumar said it is surely an area to be improved on with the right policies in place to support the entire activity and to take it to the next level of efficiency. Government agencies should encourage plantation companies with downstream activities to produce electricity and supply this to the nearest grids.

He said liquefied bio-methane gas is another viable option to replace fossil fuel supply for plantation activities. The technology is available and farm machineries are fitted with the required change-over kits to use this liquefied gas.

"The government should consider offering attractive buyback tariffs as well as tax exemptions for power plant machineries and incentives for plantation companies with palm oil mills, to encourage them to embark on biogas/biomass power plants, with improved confidence of sustainable contributions," he said.

"Biogas/biomass power projects are economically and commercially viable but to bring this business activity to the next level, the buyback tariffs have to be attractive."

He also noted that the operations of biogas/biomass power plants should be monitored to make sure the wastes produced are treated properly and according to existing stringent guidelines. All these are necessary to ensure that these plants do not turn into pollution centres on their own.

Previously, palm oil mills were regarded as pollution centres. With the required regulations in place, the negative image is slowly being removed but it still requires close monitoring of practices in order to fully emerge as a clean industry.

In terms of policies and incentives, Ir. Kumar said the Thai government is "doing enough" for owners of palm oil mills who have put up biogas/biomass power plants but more need to be done to take the industry to the next level of sustainability.

On the technological limitations and hurdles in Malaysia, he said the available technologies can definitely be improved to enhance efficiency in many related aspects of power production from biomass/biogas. The mechanical and heat efficiency within the plant is surely one aspect that can be improved drastically. Control measures on quality of raw materials and volume are other aspects that can enhance power plant output.

Overall, he said, the palm oil industry (from the point of land clearing to the delivery of the final products) has recently gone through great improvements "in a very sustainable method".

Government policies and commitment from plantation companies have contributed largely to this. However, this should be enhanced to ensure the country's largest agriculture activity will ensure and contribute strongly to the safety and preservation of the environment. Commitment from all sectors involved is required for it to be sustainable not only in improved production but also in improved climate and environment.

Ir. Kumar said that with or without governing regulations, the industry should be fully committed to protecting the environment in order to protect the palm oil industry. ■