

**Commission on Science and Technology for Development**

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**Report on the Conference of Global Food Security: The Role  
of Science and Technology**

Sutera Harbour Resort  
Kota Kinabalu, Sabah, Malaysia  
17–18 February 2009

**Prepared by National Biotechnology Division (BIOTEK), Ministry of Science,  
Technology and Innovation, Malaysia<sup>1</sup>**

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<sup>1</sup> **DISCLAIMER: The views presented here are the authors' and do not necessarily reflect the views and position of the United Nations or UNCTAD.**

## **Introduction**

### **A. Overview of the global food crisis**

1. Recent developments have led to dramatic increases in world food prices, creating a global crisis and causing political and economical instability and social unrest in both developing and developed nations. Systemic causes for the worldwide increases in food prices continue to be the subject of debate. Initial causes of the late 2006 price spikes included unusually severe droughts in grain-producing nations and rising oil prices. Oil prices further escalated the costs of fertilizers, food transport, and industrial agriculture. Other causes may be the increasing use of biofuels in developed countries (see also food vs. fuel), and an increasing demand for a more varied diet (especially meat) across the expanding middle-class populations of Asia. These factors, coupled with falling world food stockpiles, have all contributed to the dramatic worldwide rise in food prices. Long-term causes remain a topic of debate. These may include structural changes in trade and agricultural production, agricultural price supports and subsidies in developed nations, diversion of food commodities to high-input foods and fuel, commodity market speculation and climate change. Due to these issues and recent development mentioned above and the world is facing uncertainty with the global economic downturn, the Commission of Science and Technology Development (CSTD) was recommended to initiate the discussion and to organize a Conference on Food Security, focusing on addressing the food crisis with science and technology.

### **B. About the conference**

2. “The Conference on Global Food Security: The Role of Science and Technology”, 17–18 February 2009, in Kota Kinabalu, Sabah, was the first international conference addressing on the food security in Malaysia. It was able to bring together close to 200 agriculture professionals, researchers, policymakers, industry representatives, NGOs and academics from within the country and also included several CSTD member states and representatives from countries in the ASEAN region.

### **C. Objectives**

3. The conference fulfilled the objectives of the conference as listed below:
- (a) To discuss on how science and technology would assist in reducing the impact of the food crisis;
  - (b) To share the understanding, current status and needs of food security;
  - (c) To establish a mutual understanding in action plans among members on reducing the global food crisis problem; and
  - (d) To strengthen a strong global networking among members in food science and technology to overcome future food crisis.

### **D. Venue**

4. The venue of the meeting was at the Sutera Harbour Resort.

## **I. Report and proposals of the conference**

### **A. Report of the conference**

5. The Conference on Global Food Security: The Role of Science and Technology, with the theme “Addressing the Food Crisis”, was officiated by the Rt. Hon. Datuk Seri Panglima Musa Haji Aman, Chief Minister of Sabah, and was attended by 233 participants – representative of the CSTD members states, government agencies, private companies, researchers and non-government organizations.

6. In the conference, a total of 12 papers were presented in 5 sessions. There was a forum session on the final day. The conference had local and foreign speakers with expertise in agriculture field addressing the food crisis issue. Among them were Dr. Albert Sasson, a well-known consultant in biotechnology and Dr. Nina Federoff, Science Adviser to the Secretary State of the United States of America.

7. The conference was organized jointly with contributions by three government ministries in Malaysia – the Ministry of Science, Technology and Innovation, Ministry of Agriculture and Agro-Based Industries and Ministry of Plantation Industries and Commodities – and the office of Sabah’s Chief Minister, Malaysia.

8. Throughout the two-day conference, discussions were focused on the action plans to be implemented according to the respective time frame, i.e. short to medium term, regional development and the way forward in addressing the food crisis through science and technology (S&T).

9. All forum panellists agreed that the increase in fossil fuel price, raw materials and processes, climate change, bio-fuel production from food, limited land area for agriculture and poor irrigation system were major contributing factors to the world food crisis. All of these factors resulted in poor food production among main food producing countries and hence made them unable to fulfill world food demand.

10. The conference also produced a consensus; that the food crisis issue which can be resolved by using the science and technology in all countries with priorities given in the agro-based economy activities and policies to support its development.

11. Suggested action plans to cater for the different timeframes are as follows:

(a) In the short term, more encouragement should be given to research and development (R&D) through various methodologies to increase the output per unit/hectares of rice and vegetables, including meat production. There was a suggestion to increase productivity in rural agriculture to meet food demand. Innovative approach to increase the quality and productivity of agriculture was highlighted, particularly with the issue of smart partnership in intellectual property. Activities to increase productivity in fishery and aquaculture were emphasized, as 78.2 per cent of the Earth is covered with water;

(b) For medium-term measures, agriculture techniques to conserve cost and increase world food production to fulfill the demands of increasing world human population are needed. The need to increase productivity of rice and other food crops can be solved through the implementation of integrated farming management and modern technology utilization;

(c) For long-term measures, a search for alternative crops as new sources of food should be carried out. In order to achieve this objective, a collaboration

involving innovation and methodologies related to scientific and traditional knowledge is pertinent. A holistic approach in agriculture practice such as policies, sustainable farming system and environmental impact resources should be considered in every agriculture initiative.

12. To achieve sustainable development, R&D in agriculture and knowledge generation should be increased and funded by public money and investment from local or international private organizations. Through these funding mechanisms, the scope of R&D involving agriculture technologies, food security and safety, climate and environmental changes can be widened and improved.

13. Collaboration and capacity-sharing in science and technology are seen as able to assist poor farmers in agriculture productivities. The conference also suggested that free trade areas and subsidies in agriculture should be extended internationally to improve the productivity of food production. Other than agriculture technologies, the issue of food sovereignty was also being highlighted.

14. In the final session of the conference, a list of resolutions and action plans were suggested for the CSTD member states. The list is as follows:

(a) To evaluate and determine technology methodologies and applications which will be implemented to eradicate the world food crisis. One standard mechanism should be implemented to encourage experience sharing in research;

(b) To encourage sharing of technologies and to collaborate in improving agriculture/food productivity. For example, Malaysia can request advice and share experience with Brazil in animal breeding technology (meat production);

(c) To increase value in R&D activities through utilization of R&D knowledge in agriculture sector and food production;

(d) To consider consumers' proposals and demand in agriculture and food production (while planning for national R&D activities);

(e) To foster R&D collaborations with European Communities through European Union (EU) in capacity-building and development of world standard research ability in the agriculture and food production sector;

(f) To understand the uniqueness and biological complexity system of crops and animal breeding in R&D initiatives to improve food productivity and quality;

(g) To assist farmers directly by providing technological knowledge to improve food productivity and indirectly improve the farmers life quality – subsistence farmers need help to step up food yield but also other factors to address poverty;

(h) To acknowledge the need of a second green revolution. All efforts and activities should be planned and coordinated to double the world food output by 2050;

(i) To acknowledge local knowledge activity as a form of technology and as one of the resources to improve crops and animal breeding productivity;

(j) To acknowledge the fertilizer cost, including usage and effect on the ecosystem, and promoting using nitrogen fixation; and

(k) To address the food shortage of those people who are starving to death in 37 countries. The food crisis is not just a technical problem, but also has social and political factors.

## **B. Proposals from the conference**

15. Proposals to be shared among the CSTD members states derived from the output of the conference are listed below:

(a) To observe the potential of utilization the irrigation system, and new technologies from China and Japan in improving rice productivity. The technique known as Gedong Model Paddy Farm is currently practiced in Malaysia. This technique can attract small-scale farmers and can be easily practiced among the farmers;

(b) In Malaysia, this technique is used by the Federal Land Consolidation and Rehabilitation Authority (FELCRA) on the large-scale concept in estate farming. This kind of farming is still at the initial stage and trial implementation of this technique is being carried out at FELCRA-owned estates;

(c) A system with synergized rice production for small farmers collaborating with cooperation/joint venture companies was suggested. Large-scale farming of rice will help solve the irrigation problem as a more manageable system can be implemented. High-quality seed is an important element to be considered to improve productivity and quality of agriculture. When all farmers collaborate in a large-scale farming, utilization of seeds, fertilizer and others can be managed collectively and effectively;

(d) Research towards gene manipulation technology should be given more attention, to better understand its potential to increase productivity;

(e) In the information-sharing spirit, utilization of modern technologies in the agriculture sector such as information and communication technology (ICT) should be practiced. ICT can assist in creating a land utilization monitoring system. Technology mapping will able to provide a precise information/image for suitable land for agriculture; and

(f) Utilization of global positioning system (GPS) and remote sensing should be encouraged whenever possible to provide important information to farmers on fertilizer usage, land utilization and crop productivity prediction.

## Annex I

### List of speakers and chairs

17 February 2009

| Session   | Chair  | Speaker   | Topic of presentation   |
|---|--|---|---|
| Session :<br>Global Food<br>Crisis<br>Scenario                  | <b>H.E. Jose Manuel Ovalle</b><br>Ambassador of Chile In<br>Malaysia   | <b>Dr. Albert Sasson</b><br>Consultant for UNESCO and<br>other United Nations/<br>International Organization on<br>Biotechnology            | Feeding Tomorrow's World  |
| Session 2:<br>Food<br>Security -<br>Short-term<br>Measures      | <b>Dato' Abdul Hanan Alang<br/>Endut</b><br>Secretary-General<br>Ministry of Science ,<br>Technology and Innovation<br>(MOSTI), Malaysia | <b>Datuk Dr. Abd. Shukor b. Abd.<br/>Rahman,</b><br>DG Malaysian Agriculture<br>Research Development Institute<br>(MARDI)                   | Upgrading Current<br>Production Technologies In<br>Malaysia Context                             |
|   |  | <b>Dr. Richard Jefferson</b><br>CEO, CAMBIA, Canberra,<br>Australia   | Open Innovation: A<br>Revolution In Harnessing<br>Science for Equitable<br>Global Food Security |
|   |  | <b>Dr. Ridzwan Abdul Rahman</b><br>Dean, School of Sustainable<br>Development<br>Universiti Malaysia Sabah                                  | Expanding Role of<br>Acquaculture in Addressing<br>Food Security                                |
| Session 3:<br>Food<br>Security –<br>Medium-<br>term<br>Measures | <b>Dato' Dr. Mohammed<br/>Noor Embi</b><br>Director of National<br>Biotechnology Division,<br>MOSTI                                      | <b>Dato' Dr. Choo Yuen May</b><br>Deputy Director Malaysian Palm<br>Oil Board (MPOB)  | Oil Palm Industry and the<br>Global Food Security   |
|   |  | <b>Dr. Hirzun Mohd Yusof</b><br>Vice-President I<br>Sime Darby Technology Centre  | Sime Darby's Rice Project -<br>Moving towards 90% self-<br>sufficiency Level                    |
|   |  | <b>Dr. Nina Federoff,</b><br><u>Penn State</u> University & Science<br>and Technology Adviser to<br><u>United States Secretary of State</u> | The Role of Contemporary<br>Genetic Modification of<br>Plants in Global Food<br>Security.       |

18 February 2009

| <b>Session</b>  | <b>Chair</b>  | <b>Speaker</b>  | <b>Topic</b>  |
|---|---|---|---|
| Session 4:<br>Food<br>Security–<br>Long-term<br>Measures  | <b>Datuk Wira Ismail Salleh</b><br>Secretary General<br>Ministry of Plantation<br>Industries and<br>Commodities (MPIC),<br>Malaysia | <b>Dr. Sayed Azam-Ali</b><br>University of Nottingham,<br>Malaysia Campus   | Crop for The Future to address<br>Global Food Crisis              |
|   |   | <b>Dato’ Dr. A.H. Zakri</b><br>Universiti Sains Malaysia  | Food Security and Sustainable<br>Development                      |
|   |   | <b>Dr. Hassan Mat Daud</b><br>DG, Institute Agriculture<br>Biotechnology (ABI)  | Agro-Biotechnology at A<br>Cross-Road for Developing<br>Countries |
| Session 5:<br>Focusing on<br>Regional<br>Develop-<br>ment | <b>Dr. Richard Jefferson</b><br>CEO, CAMBIA,<br>Canberra, Australia   | <b>Ahmad Helmi Abdul Halim,</b><br>Director, Technology<br>Portfolio Management,<br>MIMOS Bhd.                              | Sustainable Agriculture<br>Through ICT Implementation             |
|   |   | <b>P. Ragu</b> General Manager<br>(R&D), Federal Land<br>Consolidation and<br>Rehabilitation Authority<br>( <i>FELCRA</i> ) | Estate Management On Rice<br>Production                           |
| Session 6:<br>Discussion<br>Forum                         | <b>Dato’ Dr. A.H. Zakri</b><br>Tuanku Chancellor<br>Chair<br>Universiti Sains<br>Malaysia   | Panel:<br>1. Prof. Dr. Albert Sasson<br>2. Prof. Dr. Sayed Azam-Ali<br>3. Richard Jefferson                                 | The Way-Forward :<br>Overcoming Constraints to<br>Food Security   |

## Annex II

### Abstracts

#### A. Feeding tomorrow's world

**Prof. Albert Sasson, Member of the Hassan II Academy of Science and Technology, Rabat, Morocco and former Assistant Director-General of UNESCO (Paris)**

Can the Earth feed 9 billion or 10 billion people? Yes, if global concerted action is carried out to decrease humankind's "ecological footprint" through a drastic revision of current consumption habits, and to promote agricultural and economic policies that foster agri-food production at local, regional and world levels, without damaging the environment in an irreversible way.

Among the causes of the recent global food crisis (weather vagaries and climate change, particularly droughts and floods in food-exporting countries; phytosanitary threats; steep rise in oil and agricultural inputs prices; commodity export curbs, falling stocks and speculation; production of agro-fuels), the major one is the inadequate food supply that cannot meet the demand. This means that agriculture and agro-agricultural research and development did not receive the needed investments and lost their priority on the political agendas.

Consequently, it is urgent to re-establish that priority in every country and region, in order to produce more and better. Such urgency is demonstrated by the fact that an increasing number of countries try to ensure their food security through national measures, but also through international actions, e.g. lease arable land far from their national territories in order to guarantee a supply of food to their populations.

We have the appropriate tools to produce more food worldwide, while respecting the environment and consume less agricultural inputs such as water, fertilizers, herbicides and pesticides. Experts consider that yields of food crops could be duplicated worldwide and consequently the life of 5 million poor families of farmers could be improved in 2020, and that the proportion of agricultural inputs could be reduced by 30 per cent.

The appropriate tools are: rational agriculture and agronomy (reduced use of water, soil fertility, pesticide reduction and better assimilation of fertilizers); agro-biotechnologies, including transgenic crops; and crop genomics and advanced breeding.

As examples:

(a) Through a slight increase in fertilizer use (subsidized by the government), Malawi's farmers have increased maize yields significantly and the country moved from the importer status to the exporter one;

(b) Gene transfer to crops is becoming more efficient. In 2008, only three distinct genes could be transferred to a single plant of maize (*Bt* toxin gene, herbicide-tolerance gene and rootworm-resistance gene). In 2010, eight genes will be transferred to Monsanto's maize Smartstax variety. The medium-term objective is to transfer 20 genes into the same plant;

(c) In 2012, a drought-tolerant maize variety will be commercialized, also providing a good yield; this maize is currently being tested in field trials in the United States and Africa;

(d) Drought-tolerance is a top research priority because of climate change and the scarcity of water;

(e) In addition to deciphering the rice genome, those of poplar and vine, the genome of maize variety B73 has been published by United States researchers, while Mexican geneticists are finalizing their work on the genome of one of the seven basic lines of maize (4,000 years old) of Mexico. This work is focused on the identification of genes that are involved in drought tolerance;

(f) Sorghum and wheat genomics are also making good progress.

The road map:

We know what should be done to meet the challenges raised by the global food crisis in a sustainable way and concerning rural infrastructures, storage of agricultural produce, irrigation and water management, transport, funding of harvest campaigns, organization of markets, loans and microcredit to family farming communities. Emphasizing the growing imbalance between the demand for food worldwide and the supply that is shrinking, as the main cause of the crisis, and of similar events in the future, experts have stressed that only a “double green revolution”, i.e. both ecological and hyper-technological, could feed 9 billion to 10 billion people, while providing a decent income to small farmers (who represent three-quarters of the global poor).

“It is through research and innovation by the farming communities that the world could feed itself”, stated the president of the French National Agricultural Research Institute in 2008. One may add, *and* through good governance

## **B. Open innovation: a revolution in harnessing science for equitable global food security**

**Dr. Richard Jefferson, CAMBIA, Australia**

“Open innovation” describes a new paradigm for transparently, inclusively and efficiently harnessing science and technology for social and economic progress. To be effective, this paradigm requires a dramatic change in how we understand, visualize, use and combine intellectual property, particular patents.

To see the potential impact of such a change in the engagement of small-to-medium enterprise in wealth creation, we can look at the information and communications technology sector (ICT) that has used it in another form called “open source”.

Open source has revolutionized and energized information and communications technology. It has created billions in new wealth and new opportunities. It has forged a vigorous, competitive industry with great public support. It has gone well past the rhetoric of “giving away” and moved into the logic of “creating a shared and robust platform on which to innovate”.

This is just what agriculture and indeed other life sciences enabled innovation sectors needs. We cannot take the approaches from software and shoehorn them into the altogether different sectors that are powered by life sciences. But we can learn from the successes and failures, and look to create similar efficiencies and to leverage similar community creativity.

I will describe the experiences of CAMBIA ([www.cambia.org](http://www.cambia.org)) in the first years of the BiOS initiative (Biological Innovation or Open Society, or Biological “Open Source” ([www.bios.net](http://www.bios.net)), and outline where the similarities in approach are useful and where the divergences are instructive. We have explored

inventing new gene transfer technologies to bypass patent restrictions and broaden the user base of these technologies, and we have experimented with new licensing mechanisms for the sharing of the tools. This experience, including licensing over 200 companies and institutions with our toolkit has been greatly instructive.

I will outline a way forward for creating a new public Commons of Capability around enabling technologies that can be used by any entity, anywhere, and how this could stimulate an inclusive and transparent sector, where competition is at the level of product and service, not at the level of “getting to the starting gate”.

I will conclude by describing the new Initiative for Open Innovation, recently funded by the Gates Foundation, which seeks to create new innovation ecologies based on comprehensive, evidence-based navigation and decision support in the complex worlds of patenting in life sciences.

Built upon the Patent Lens ([www.patentlens.net](http://www.patentlens.net)), already one of the most prominent public patent searching tools on the Internet, we will be creating a language, sector and jurisdiction agnostic facility. We will incorporate the full text patent data from important jurisdictions and merge it with science, business and technical information into a free, public resource that facilitates open 'patent landscapes' to help users navigate the minefields and greenfields of the patent world. This resource will evolve as a Web 2.0 platform on which almost any interested party – citizens, businesses, public agencies, policymakers and investors can make better, more informed decisions.

The increase in investment confidence that this will instil, and the corresponding increase in efficiency of choice of technology and partner, will foster a new ability to forge meaningful and practical collaborations to allow small margin, small market but science-enabled innovations.

The public deserves and the world requires new approaches to using science in agriculture.

We need to explore new ecologies of innovation where the tools and platforms are dynamic and shared, but the outcomes of their use can be as varied as the imagination and business models of their users. Global food security is only achievable when we ensure the “freedom to innovate” by those most impacted by hunger and poverty, and when we empower the enterprise and creativity of diverse communities, businesses and institutions to use science as a critical tool for innovation.

### **C. Expanding role of aquaculture in addressing food crisis**

**Dr. Ridzwan A. Rahman, Dean, School of Sustainable Agriculture, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia**

Out of a 6.6 billion human population on Earth today, 1 billion do not have enough food to eat. This hunger and malnutrition of such a vast population is a source of instability in many countries. Human security hinges on the security of basic services such as food and health. The problem is of enormous magnitude but there is a solution to it. The solution requires knowledge-based (smart) decisions and effective implementation of the decisions. Producing seafood is a smart decision in the sense that sea covers 70.8 per cent of the earth surface whereas land covers only 29.2 per cent. Land areas have to be utilized for human settlement, forests, wildlife, industry, land-based agriculture among other needs. Unlike land, sea is vast and free from some of these uses, and therefore

provides far greater resources for food production. Annual seafood production from fisheries and aquaculture stands around 135 million tons. Aquaculture contributes some 48 million tons. With increase in seafood demand and decline in capture fisheries, aquaculture is likely to expand to bridge the gap between supply and demand. The rate at which the human population is growing, it is expected to reach >8 billion by the year 2030 and by that time the seafood demand would be no less than 180 million tons. This additional seafood requirement will have to come from aquaculture and the rate of growth of this sector will have to increase beyond the 10 per cent per year that it has maintained since 1970.

Aquaculture can contribute to food security in various ways: Increasing production (of seafood), reducing prices (by increased supply), improving opportunities for income (affordability) and enhancing access to high protein food. However, since aquaculture production is highly variable globally, it makes sense to consider its direct contribution to food security at regional level. The Asia-Pacific region shares as much as 89–91 per cent of the global aquaculture production and therefore its role needs to be assessed differently according to output from various regions. Aquaculture development faces many challenges which need to be addressed in order for it to play an increasing role in global seafood security. These challenges can be met in various ways: (a) production of high-quality seed in sufficient quantity by hatchery technology, captive breeding, selective breeding, hybridization and larval rearing; (b) environmental compatibility using techniques such as water recirculation, biofiltration, aquaponics, and making use of prey fish substitutes sourced from sustainable systems); (c) biosecurity by methods aimed at disease exclusion, boosting immunity as far as possible, vaccination, stress reduction and using antibiotic substitutes as well as specific pathogen testing; (d) public health security that ensures that the food produced poses no risks to human health; and (e) solving grow-out problems by preventing crops from red tides, offshore farming and new cage designs.

Aquaculture can contribute to saving the environment by providing means of producing food in the sea, thus protecting forests from conversion into farms and increasing supply of seafood to the market, thus reducing fishing pressure on wild stocks and lessening threat to marine biodiversity. Aquaculture is more resilient to climate change and is less vulnerable to many land crops vis-à-vis impact of climate change. For better appreciation of the role of aquaculture some appropriate methods which can quantify its contribution to food security should be developed.

#### **D. The role of contemporary genetic modification of plants in global food security**

**Prof. Dr. Nina Federoff, Science and Technology Adviser to the United States Secretary of State and to the Administrator of the United States Agency for International Development**

Science has played a significant role in raising the level of agricultural productivity over the past two centuries in many, but not all, countries. The lecture will review the major advances in plant farming techniques, as well as genetic modification of plants, some dating to prehistoric times. The lecture will describe the scientific basis of current methods of molecular modification, often referred to as GM, and show examples of current genetic modifications. The

lecture will also address commonly articulated concerns about GM foods and overview the current state of knowledge and experience with GM crops.

## **E. Oil palm industry and the global food security**

**Dato' Dr. Choo Yuen May, Deputy Director-General of Malaysian Palm Oil Board (MPOB)**

Food is an important provider of energy for both physical and mental development of mankind. The minimum dietary energy requirement for each person on average is just below 2,000 kcal/day. Malaysia, with its palm oil production at 17.73 million t in 2008 with export of 15.41 million tons, is a major contributor of energy in terms of oils and fats for the world population. In an effort to continuously provide energy for human needs, the Malaysian palm oil industry through R&D by MPOB, universities and research institutes have targeted production of high yielding oil palm trees through intensive research on agro-biotechnology.

Arising from the research activities, the versatile nature of palm oil has allowed it to be converted easily into various food products such as margarine, shortening, frying oil, ice cream, confectionary fats, bakery fat, etc. By-product of the processing of palm oil has paved the way for new nutraceuticals based on the phytonutrients extracted. Besides food, non-food products are also manufactured from palm. Though palm oil and its biomass are a ready feedstock for bioenergy, the industry is cautious that the priority of palm oil for food is maintained while the biomass is used as a feedstock for the second generation biofuel.

To ensure high quality, food safety and sustainable supply of palm oil, the codes of practice along the whole oil palm supply chain have been developed. Nutritional attributes, widely researched nationally and internationally, are to provide a high level of confidence to consumer on the wholesome goodness and healthiness of palm oil consumption. The industry in providing an uninterrupted supply of palm oil is also an economic provider for the smallholders in the rural areas. The palms are intercropped in the immature stage and integrated with livestock during mature stage to produce important sources of carbohydrate and animal protein to supplement the production of oils and fats thereby producing the three basic food items on the same land. Looking forward the industry is working towards calculating its carbon footprint (CFP) based on the lifecycle of the carbon emissions associated with various palm oil products along the supply chain. The CFP comparison will help companies to reduce the GHG emissions used in the different products whereupon increasing the competitiveness of palm oil and its products.

*\*A joint paper with Datuk Dr. Mohd Basri Wahid, Director General of Malaysian Palm Oil Board (MPOB).*

## **F. Crops for the future and the global food crisis**

**Prof. Sayed Azam-Ali, University of Nottingham, Malaysia Campus**

Whilst humans have been on Earth for at least 250,000 years, we have farmed intensively for only a few decades. This tiny proportion of our history has seen unprecedented changes in the range of crops and animals we grow and the foods we eat. The global move towards a "Green Revolution" model of agriculture is inevitably leading to a globally common diet. Irrespective of location and

culture, most of us now eat similar foods processed from a few crop species, most of which are cereals.

Humanity has grown from perhaps 0.001 billion people at the start of agriculture to about 6.67 billion today. Over this period, there has been an unprecedented decline in the number of crop *species* on which we depend and the diversity of cropping *systems* in which they are grown. Of the 300,000 to 500,000 plant species, 30,000 are edible and about 7,000 have been cultivated or collected by humans for food. However, fewer than 20 species now account for more than 90 per cent of global food. Indeed only three – rice, wheat and maize – provide more than 60 per cent of the plant-derived energy in our diet. This intensification has profoundly influenced the diversity of modern agriculture as many local crops and cropping systems are displaced by a few ‘major’ crops grown as monocultures. Similarly, scientific research is increasingly consigned to a narrow range of specialist ‘silos’ dedicated to major species and ‘model’ plants.

Climate change will transform agriculture; exactly how and by how much is unclear. However, future climates will probably be more volatile and even where we can support “Green Revolution” cultivars, with even greater inputs and management, agriculture will become more vulnerable to climatic extremes than at present. The reduction of agriculture to a few major crops grown as monocultures has been justified because, for most of us, it has ensured food security. However, for *future, global*, food security we must reconsider the vast repository of underutilised crops that have survived despite rather than because of scientific research. Future food security cannot just depend on further “climate-proofing” elite crop species but must also incorporate underutilised species that are already resilient to volatile climates.

If we accept the need to diversify agriculture, how can we identify those underutilised crops that are best suited to become “crops of the future”? As climate change scenarios are themselves uncertain, it is already difficult to match specific crops to future climates. However, we can at least consider which *approach* is best suited to evaluate potentially valuable crops. This paper describes one such approach involving research on bambara groundnut (*Vigna subterranea*) – an underutilised African legume. The paper also describes the new international ‘Crops for the Future’ organisation that will support, collect, synthesize and promote knowledge on underutilised species.

This paper concludes that;

- (a) Climate change means that we will *all* need to adapt to more volatile climates;
- (b) Persevering with just major crops is simply too risky for global food security;
- (c) Truly global food security will need a massive research effort to improve many underutilised species with potential for future climates; and
- (d) We need a “paradigm shift” from our current reductive approach to one that combines local knowledge, qualitative and quantitative data and new technologies to rapidly evaluate and improve a wide range of “crops for the future”.

## **G. Agro-biotechnology at a crossroads for developing countries**

**Dr. Hassan Mat Daud, Director-General of Malaysia Agro-Biotechnology Institute (ABI)**

The growing world population, which is projected to be 9 billion by 2040 with over 85 per cent in lesser developing countries, decreasing land area available for food production, and unprecedented climate change pose significant challenges to agriculture and food production around the world. Modern agriculture demands contributions of high technologies such as biotechnology to overcome some of these challenges. On the other side, biotechnology is a high investment; requires highly trained personnel to conquer and apply the technology. This paper attempts to address this situation from the perspective of a developing country.

## **H. Sustainable agriculture through ICT implementation**

**Ahmad Helmi Abdul Halim, Director, Technology Portfolio Management MIMOS Bhd.**

This is an approximately 30 minute talk of innovative implementation of frontier ICT technologies developed by MIMOS lab. The speaker will touch briefly key requirements of the agriculture industries realized through the implementation of the aforementioned technologies

## **I. Estate management on rice production**

**P. Ragu, General Manager Research and Development Federal Land Consolidation and Rehabilitation Authority (FELCRA)**

FELCRA has been assigned with the task of rehabilitation and consolidation of land aimed at uplifting socio-economic status of the rural poor. In the early 1970s, Felcra activities were focused on rehabilitation of individually-owned land (made available by the state government). The lot system practiced then, in which the individuals themselves managed their land did not give favourable results and deemed not a suitable management system with large acreages. Hence the implementation of the share system or the estate system where all the individual lands are collectively managed as a single entity which allowed for speedier adoption of technologies and immediate intervention from the management when conditions arise. In a particular land scheme all activities are centrally planned and managed and almost all of FELCRA'S land schemes are managed this way – including rice.

## Annex III

### Photographs



Datuk Seri Panglima Musa Haji Aman officiating the Conference of Global Food Security with the Minister of Science, Technology and Innovation Malaysia.



Minister of Science, Technology and Innovation Malaysia, Datuk Dr. Maximus J. Ongkili giving his welcoming remarks.



The Minister of Science, Technology and Innovation Malaysia sharing some light moments with Dr. Nina Federoff, Science and Technology Adviser to the United States Secretary of State and to the Administrator of the United States Agency for International Development with Dato' Abdul Wahab Abdullah, CEO of MIMOS Berhad.



Forum panelists (from left), Prof. Dato' A.H. Zakri, Dr. Albert Sasson, Dr. Sayed Azam Ali and Dr. Richard Jefferson.

## Annex IV

### Speeches (texts)<sup>2</sup>

#### Opening Speech by:

#### **The Right Hon. Datuk Seri Panglima Musa Haji Aman, The Chief Minister of Sabah**

The Honourable Datuk Dr. Maximus J. Ongkili,

Minister for Science, Technology and Innovation Malaysia/Vice Chair of the Commission on Science and Technology for Development (CSTD), United Nations,

His Excellency Juan Eduardo Eguiguren,

Chair of the Commission on Science and Technology for Development (CSTD), United Nations,

The Hon. Members of Parliaments,

His Excellencies Ambassadors,

Heads of Departments,

Member of the Press, Distinguished Participants, Ladies and Gentlemen.

A very good morning, and a warm welcome to our foreign guests. It gives me great pleasure to be here to officiate this very important conference.

Allow me to extend a word of thanks to the Ministry of Science, Technology and Innovation, and the Commission on Science and Technology for Development, United Nations, for recognizing the need to organize this timely conference. I also wish to record my appreciation to Science, Technology and Innovation Minister Datuk Dr Maximus J. Ongkili who through his role in the Federal cabinet is working very hard to make sure that Malaysia moves into the very significant fields of science and technology, by harnessing local talent and resources.

Ladies and Gentlemen,

The global food crisis is already having negative impact and tragic consequences in many countries, and this conference illustrates the urgency of an effective global response. Growing population, climate change, a growing risk of failing harvests, and the current economic crisis will further accelerate the problem in the coming years. Global food security is a complex issue that requires urgent response from the international community.

Prices of many basic food items have gone up in the last two years, affecting millions of poor people worldwide. Recently, the World Bank reported that global food prices have risen by 83%, and the Food and Agriculture Organization (FAO) cited a 45% increase in the world food price index. FAO estimates around 852 million people are chronically hungry due to extreme poverty, while up to 2 billion people lack food security, due to varying degrees of poverty. These figures reflect the need for immediate and extraordinary measures to avoid a situation where more people may have to go hungry, or miss out on important nutrients. Science and technology have been proven to propel

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<sup>2</sup> As provided to the UNCTAD secretariat.

economic growth, eliminate poverty and encourage sustainable development. I strongly believe that all countries should consider strategies that enhance science-based research and development of food and encourage new and innovative food technologies.

Biotechnology which is poised to drive the next wave of knowledge-based industries, is another powerful tool in addressing food security and hunger. Biotechnology can be used to boost supply of safe, nutritious and affordable food.

In this regard, I hope there will be more scientific discoveries and innovations, including in the biotechnology sector, to improve crop yields and enhance the food industry. Application of biotechnology platform technologies such as genetic engineering and functional genomics will be encouraged to produce agro-biotechnology products that increase plant and livestock productivity as well as improve their agronomic traits.

Ladies and Gentlemen,

To transform and enhance the value creation of the agricultural sector, Malaysia has formulated the National Biotechnology Policy that will translate the nation's biotechnological assets into the growth of the K-economy and accelerate Malaysia's transformation into a highly industrialized nation by 2020. The implementation of the policy has received strong governmental commitment, through financial support for its research and development (R&D), infrastructure and human resource development (HRD). Malaysia is basically an agriculture-based country; therefore, agricultural and food technologies have received greater emphasis. To ensure adequate food supply, the Government of Malaysia has implemented various agricultural programmes. Under the National Food Security Policy, a sum of RM5.6 billion has been allocated to enhance agricultural activities. The Government has also allocated RM300 million to increase fish landings, and will provide 220,000 padi farmers with incentives to increase padi production, involving an allocation of RM1 billion.

Just like the Federal Government, the Sabah State Government too is committed in efforts to make sure that we have enough food supply at affordable costs. The Sabah Government has underlined agriculture as one of three engines of growth, the other two being manufacturing and tourism. These engines of growth are further emphasized under the Sabah Development Corridor (SDC) blueprint that was launched more than a year ago. The agriculture, fisheries and livestock sectors, along with food production remain important pursuits.

Programmes are being carried out in all districts to encourage farmers to keep on planting edible crops and for more people to get involved in rearing livestock. I am pleased to share with you that food safety remains at the top of our agenda in our quest to reduce the impact of a food crisis. A couple of months back, the State Agriculture and Food Industry Ministry declared that milk produced in Sabah is a 100% melamine free. I am sure other food sectors too are working towards the goal of producing food items that are safe. We will continue to tap views from scientists on the best ways to increase food yields, without sacrificing food safety aspects.

Ladies and Gentlemen,

In an increasingly competitive global economy, the ability to leverage on science and technology will become strategically more important in national development. I am indeed very honoured to have been invited and given the opportunity to address this important gathering. I am confident that with this collective sense of cooperation, the exchange of experience and expertise by the

speakers and participants, the conference will be able to produce strategic, innovative and viable solutions, towards ending world poverty and hunger. I hope that the outcome could be integrated into action at the local and micro-levels and I look forward to receiving a copy of your report.

To our delegates from overseas and other parts of Malaysia, I hope you take some time off your very busy schedule to visit places of interest in Sabah. We are blessed with diverse coastal and land resources, and perhaps along the way, you will be able to discuss with your peers some of the potentials that Sabah has in boosting food production. We also welcome collaborations from those who are interested in assisting us in agriculture and other sectors that generate food.

On that note, I am pleased to declare the “Conference on Global Food Security: The Role of Science and Technology” open.

Thank you.

**Opening Remarks by**  
**YB. Datuk dr. Maximus J. Ongkili**  
**Minister of Science, Technology AND Innovation**

Thank you Chair Person

YAB Datuk Seri Panglima Musa Haji Aman

Chief Minister Of Sabah

YB Tuan Haji Fadillah Yusof

Deputy Minister

Ministry Of Science, Technology And Innovation (Mosti)

HE Dr. Kobsak Chutikal

(Representing The Secretary General Of Unctad)

HE Jose Manuel Ovalle

Ambassador Of Chile To Malaysia

(Representing The Chair Of Cstd)

YBhg. Dato' Abdul Hanan Alang Endut

Secretary General

Ministry Of Science, Technology And Innovation (Mosti)

Honourable Members Of Parliament And The Sabah State

Legislative Assembly, Excellencies, Government Officials,

Members of the media, Ladies and Gentlemen

A very good morning and salam sejahtera

1. It gives me great pleasure to welcome everyone to the Conference on Global Food Security: The Role of Science & Technology, jointly organized by the Government of Malaysia and the Commission on Science and Technology for Development (CSTD) United Nations.

2. To all our foreign guests, i would like to wish you "Selamat Datang" to Sabah, Malaysia, "The Land Below the Wind", one of the two states in Malaysian Borneo, a blessed state with multi-ethnic and multi-religious people living together in harmony.

3. I would like to take this opportunity to express my sincere and utmost appreciation to the Chief Minister of Sabah, YAB Datuk Seri Panglima Musa Haji Aman, for his very generous support to our proposal to host this conference in Kota Kinabalu and for graciously agreeing to officiate this conference.

Ladies and gentlemen

4. I am indeed happy that so many of you have been able to take time off of your busy schedule and join us in this conference.

5. The idea to hold this conference was first mooted in Geneva in May 2008 during the 11th session of CSTD in which I had the honour to chair. At that time, the world economy was facing grave threats to its well-being. As a result

of a combination of unprecedented threats: firstly, the price of oil has skyrocketed to unprecedented levels; secondly, the price of food has increased beyond the poor people's ability to pay. It is estimated that global food prices have risen by more than 75 percent since 2000.

6. Thirdly, the world stability was and still being challenged by international issues such as terrorism, poverty, pandemics, natural disasters, as well as climate change. These problems have come to the fore in the midst of a serious prospect of a more general and widespread global economic recession.

7. The situation clearly calls for a bold and determined global response. It was then as chair of CSTD and as the Malaysian representative, I offered the idea of Malaysia to host an international conference on Global Food Security focussing specifically on how science and technology could contribute to alleviate the food crisis. Subsequently, the Malaysian Cabinet endorsed the offer and CSTD agreed to the idea. I am confident that the conference will serve as a platform to discuss and to recommend new ideas and views in addressing global food security.

8. In this respect, we need to shape our research investments accordingly and formulate effective strategies to overcome the factors adversely affecting food production.

9. Science and technology has a vital role in sustaining modern agriculture's future; enhancing yield and productivity, bridging yield gaps, and protecting yield gains. Thus, it is imperative that we recognize and transform our efforts strategically towards this end and to seriously increase food productivity to meet the demand of the ever increasing population.

10. The challenge is not just about producing enough food. Agricultural technologies adopted to meet the needs of a hungry world must be carefully selected and utilized wisely to ensure an environmentally sustainable farming.

Ladies and gentlemen

11. CSTD is a subsidiary body of the Economic and Social Council (ECOSOC). It was established to provide the General Assembly and the Economic and Social Council with high-level advice on relevant issues. This was achieved through analysis and appropriate policy recommendations or options in order to enable those organisations to guide the future work of the United Nations, develop common policies and agree on appropriate actions.

12. As vice-chair of cstd, i observe that the Commission has been proactive in:

- the examination of science and technology questions and their implications for development;
- the advancement of understanding on science and technology policies, particularly in respect of developing countries and;
- the formulation of recommendations and guidelines on science and technology matters within the United Nations system.

13. I am confident that CSTD will continue to support initiatives to promote science and technology for the benefit of human kind.

Ladies and gentlemen

14. Let me re-emphasize that the key objective of this conference is to exchange views on best ways to counter challenges on the food security with the application of science and technology.

15. However, while deliberating on how science and technology can assist in reducing the impact of food crisis, we should also put our minds together on how to further strengthen mutual networking among CSTD members to share our knowledge towards this common mission.

16. It is my fervent hope that this conference would bear important action plans and recommendations for our mutual benefit to address food security.

17. I am confident that all participants will be able to share and produce fruitful solutions and ways to address the food security issue in this 2-day conference.

Ladies and gentlemen

18. I would also like to extend my deepest gratitude to the Sabah State Government, especially to Deputy State Secretary YBhg Datuk Maznah Abd. Ghani for co-chairing the organizing committee and rendering invaluable assistance in terms of logistics, security and other arrangements.

19. My sincere thanks too, to the co-organisers, the Ministry of Plantation Industries and Commodities Malaysia and Ministry of Agriculture and Agro-based industries for their generous support. I would like to especially mention Universiti Malaysia Sabah for extending invaluable assistance to the organizing committee in making this conference a success.

Ladies and gentlemen

20. I would like to thank everyone for their invaluable contributions to ensure the success of this event. I am certain with the overwhelming support, this conference will be a major success in all fronts.

Thank you, all the best for 2009 and beyond.

## **Closing Remarks**

**Y.BHG. Prof. Datin Paduka Dr. Khatijah Mohd Yusoff**  
**Deputy Secretary-General (Science) Ministry of Science, Technology and Innovation**

Distinguished Speakers and Participants;

Ladies and Gentlemen,

Good Afternoon,

The Honourable Datuk Dr. Maximus J. Ongkili, Vice Chair of CSTD and the Minister of Science, Technology and Innovation Malaysia sends his regards and appreciation to all of you. He has to be in another function and can't be with us today.

We have been discussing and listening to speakers in this two-day international conference which highlights on the measures to address the issue from different time periods (short to long terms), regional developments and discussion on the way forward to overcome the global food crisis. This is the first conference on global food security and the role of S&T. I hope that we will not stop here and have a follow up meeting.

We have heard of the causes of the recent global food crisis amongst others is the increase oil prices, raw materials and processes, climate change, production of bio-fuel and limited land, and water which have resulted in inadequate food supply that cannot meet the demand. There were suggestions that S&T can only address food security when the country put the priorities right especially in agriculture economy, its policies and support for its development. We need to change progressively but urgently in our consumption of food and resources.

Perhaps we should have discussed more specific successful case stories but there were presentations on both short and medium term measures. Short term measures include the current R&D initiatives for rice, vegetables and meat production through various model such as increased production in per unit area and expanding production in non-convention areas. Apart from that, the importance of open innovation approach was also highlighted. This basically means a new paradigm that requires a dramatic change in how we understand, visualize, use and combined intellectual property. Fisheries production and aquaculture should be given equal consideration to become one of the important sources of food due to decline in wild stock was also mentioned.

As for the medium term measures, techniques of plant farming and genetic modification of plants are put forward in order to increase food production to meet the demand of the ever increasing world population. Integrated farm management and modern technology should be applied to increase yield in rice production.

Ladies and Gentlemen,

To anticipate the future needs, we must explore alternative crops that have values and potential for food production in order to address food security. This requires collaboration for innovation and methodologies that include both indigenous and scientific knowledge base. A holistic approach to agriculture practices including policies, sustainable farming systems and resources which will impact the sustainability of the environment must be implemented. In

addition, in achieving development and sustainability goals, it requires increased funds and more diverse funding mechanism for agriculture research and development and associated knowledge system. These include public funding, investment in global regional, national and local public goods, food security and safety, climate change and sustainability. There is a need to increase our capacity in agriculture and extension. How do we put agriculture at the centre stage? How do we make agriculture more glamorous?

So, where do we go from here? I believe that from this conference, an action plan is required to address the food security that include identifying specific technology and practical initiatives for adoption by members state. In addition to that, networking and sharing of our capabilities in science and technology are among the important aspects to help the poor farmers who are really the people not getting enough food. Negotiations on free trade and subsidies in agriculture need to be addressed. We need to address not only food security but also food sovereignty.

Ladies and Gentlemen,

We cannot wait, we need food. We need to understand and feel the sense of urgency to address all the issues discussed in overcoming the constraints to food security. We need to look forward and outward. Let me end by repeating the quotation from Albert Einstein cited by Prof. Zakri this morning: “The significant problems we face today cannot be solved at the same level of thinking we were at when we created them”. I know that there have been several shortcomings but let us not allow them to put us off from holding future such meetings.

On behalf of the Government of Malaysia, I would like to extend my gratitude to all distinguished speakers, panelists, chairpersons and participants for contributing and making this conference a success. I hope that we can meet again to check how far we will have gone from here and meanwhile, we can continue to work together in global issues. With this I declare the conference closed.

Thank you.

## Annex V

### Conference programme<sup>3</sup>

| Date              | Time          | Programme  |
|-------------------|---------------|--|
| 16 February, 2009 | 14.00 – 16.00 | Registration   |
| 17 February 2009  | 07.00         | Registration   |
|                   | 09.30 – 10.30 | <p><b>Opening Ceremony:</b><br/>           Welcoming Remarks –</p> <ul style="list-style-type: none"> <li>• The Hon. Datuk Dr Maximus Johnity Ongkili, Minister of Science, Technology and Innovation Malaysia/Vice-Chair Commission on Science and Technology for Development (CSTD)</li> <li>• H.E. José Manuel Ovalle, Ambassador of Chile to Malaysia representing H.E. Juan Eduardo Eguiguren, Chair of Commission on Science and Technology for Development (CSTD)</li> </ul> <p><b>Opening Address:</b><br/>           The Rt. Hon. Datuk Seri Panglima Musa Haji Aman, Chief Minister of Sabah</p>   |
|                   | 10.30         | Coffee Break   |
|                   | 11.00         | <p><b>Session 1 : Global Food Crisis Scenario</b><br/> <b>Chair:</b><br/>           H.E. José Manuel Ovalle, Ambassador of Chile to Malaysia<br/> <b>Speaker:</b><br/>           1. Prof. Dr. Albert Sasson<br/>           Topic: “Feeding Tomorrow’s World”<br/> <b>Q&amp;A Session</b></p>   |
|                   | 12.30         | Lunch Break  |
|                   | 14.00         | <p><b>Session 2 : Food Security - Short-term Measures</b><br/> <b>Chair:</b><br/>           Dato’ Abdul Hanan Alang Endut, Secretary-General Ministry of Science, Technology and Innovation Malaysia (MOSTI)<br/> <b>Speakers:</b><br/>           1. Datuk Dr. Abd. Shukor b. Abd. Rahman,<br/>           Topic: Upgrading Current Production Technologies in Malaysia Context<br/><br/>           2. Richard Jefferson<br/>           Topic: Technology Diffusion Into Food Production<br/><br/>           3. Prof. Dr. Ridzwan Abd. Rahman<br/>           Topic: Expanding Role of Agriculture in Addressing Food Crisis<br/> <b>Q&amp;A Session</b></p> |
|                   | 16.00         | Coffee Break   |
|                   | 16.15         | <p><b>Session 3 : Food Security - Medium-term Measures</b><br/> <b>Chair:</b><br/>           Datuk Wira Ismail Salleh, Secretary-General Ministry of Plantation Industries and Commodities (MPIC)</p>  |

<sup>3</sup> As provided to the UNCTAD secretariat.

|                  |               |   |
|------------------|---------------|---|
|                  |               | <p><b>Speakers:</b></p> <ol style="list-style-type: none"> <li>1. Prof. Dr. Nina Federoff,<br/>Topic : The Role of Contemporary Genetic Modification of Plants in Global Food Security</li> <li>2. Dato' Dr. Choo Yuen May<br/>Topic : Oil Palm Industry and The Global Food Security</li> <li>3. Dr. Hirzun Mohd Yusof<br/>Topic : Sime Darby's Rice Project – Moving Towards 90% Self-Sufficiency Level</li> </ol> <p><b>Q&amp;A Session</b></p>  |
|                  | 18.15         | <b>End</b>  |
|                  | 19.00 – 21.00 | <b>Reception Dinner</b>   |
| 18 February 2009 | 09.00         | <p><b>Session 4 : Food Security - Long-term Measures</b></p> <p><b>Chair:</b><br/>Dato' Dr. Mohammed Noor Embi<br/>Director of National Biotechnology Division, MOSTI</p> <p><b>Speakers:</b></p> <ol style="list-style-type: none"> <li>1. Prof. Sayed Azam-Ali<br/>Topic : Crop For The Future to Address Global Food Crisis</li> <li>2. Dato' Dr. A.H. Zakri<br/>Topic : Food Security &amp; Sustainable Development</li> <li>3. Dr. Hassan Mat Daud<br/>Topic: Agro-Biotechnology at A Cross-Road For Developing Countries</li> </ol> <p><b>Q&amp;A Session</b></p> |
|                  | 11.00         | <b>Coffee Break</b>   |
|                  | 11.15         | <p><b>Session 5 : Focusing on Regional Development</b></p> <p><b>Chair:</b><br/>Richard Jefferson, CEO, CAMBIA</p> <p><b>Speakers:</b></p> <ol style="list-style-type: none"> <li>1. Ahmad Helmi Abdul Halim</li> <li>3. P.Ragu</li> </ol> <p><b>Q&amp;A Session</b></p>  |
|                  | 13.00         | <b>Lunch Break</b>  |
|                  | 14.00         | <p><b>Session 6 : Discussion Forum</b></p> <p><b>Topic :</b> The Way-Forward : Overcoming Constraints to Food Security</p> <p><b>Chair:</b> Dato' Dr. A.H. Zakri</p> <p><b>Panel:</b></p> <ol style="list-style-type: none"> <li>1. Prof. Dr. Albert Sasson</li> <li>2. Prof. Dr. Sayed Azam-Ali</li> <li>3. Richard Jefferson</li> </ol> <p><b>Q&amp;A Session</b></p>   |
|                  | 16.00         | <b>Coffee Break</b>   |
|                  | 16.30         | <p><b>Closing Remark</b></p> <p>Prof. Datin Paduka Dr. Khatijah Mohd Yusoff,<br/>Deputy Secretary-General, Ministry of Science, Technology &amp; Innovation Malaysia</p>  |

## Annex VI

### Speakers biographical data<sup>4</sup>

#### Professor Albert Sasson

**Member of the Hassan II Academy of Science and technology, Rabat, Morocco & Former Assistant Director-General of UNESCO (Paris)**

Professor Albert Sasson, a Moroccan, is a world renowned international consultant in biotechnology. He has authored over 200 publications, including his research and popularization activities in soil microbiology, algology and agrobiolgy. He has published books and contributed to publications on biology teaching, environment and development issues, biotechnologies, and on food and nutrition. “Biotechnologies in the Developing World” is one of his outstanding publications.

Prof. Sasson is a prolific speaker, with invaluable information and insight in the areas of cloning; genetically modified foods; the use of biotechnology in agriculture and its possible impact on man and the environment; and biotechnology - ethical and legal considerations. He has expert knowledge of how biotechnology can reduce poverty and the successes and failures of its application worldwide.

After a career as a University Dean he joined UNESCO in 1974 where he served as Special Advisor to the UN for over 27 years. Since January 2000, Prof. Sasson has been senior consultant to UNESCO, Moroccan institutions and the company Publicis Dialog (Paris). He provides special advice to Governments worldwide on the development of national policies on biotechnology, and is an advocate for adaptation of technologies by the third world for their social and economic development.

Prof. Albert Sasson is a man with a passion for science, especially for discoveries in the life sciences. He is truly fascinated with the application of science to food, agriculture, medicine, pharmaceutical, energy, environment and bio-remediation.

#### Datuk Dr. Abd. Shukor Abd. Rahman

1. Name: Datuk Dr. Abd. Shukor Abd. Rahman
2. Designation: Director General MARDI
3. Joined MARDI: 1978 (31 years)
4. Academic Qualification:
  - i. PhD - University of Florida, USA – 1993  
- Postharvest Physiology of Fruits & Vegetable
  - ii. MSc - University of Florida, USA – 1983  
- Postharvest Physiology of Fruits & Vegetable
  - iii. B.Agr.Sc - University of Agriculture Malaysia – 1978  
- Agriculture Science (Major: Entomology)
5. Management Experience:

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<sup>4</sup> As provided to the UNCTAD secretariat.

- i. Director General MARDI  
(13 November 2005 – present)
  - ii. Deputy Director General (Research), MARDI  
(2<sup>nd</sup> May 2004 – 12 November 2005)
  - iii. Director  
Horticulture Research Centre, MARDI  
(1997 – 2004)
  - iv. Deputy Director  
Horticulture Research Centre, MARDI  
(1996 – 1997)
6. Professional Course Attended:  
Advanced Management Programme Harvard Business School, USA  
(9 weeks: Sept. – Oct. 2003)
7. Honors and Awards:
- i. MARDI Gold Medal Award – Banana Research Team, 1987
  - ii. IAEA Fellowship Award at the University of Hawaii and Tropical Fruit Research Centre, Miami, USA, 1989
  - iii. Best Paper Award – American Society for Horticultural Science, 1995
  - iv. MARDI Excellence Service Award – Melintang, 1996
  - v. MARDI Excellence Service Award – Melintang, 2001
  - vi. Award ‘Dato’ Paduka Setia Mahkota Kelantan’ (D.P.S.K.) 1.4.2007
  - vii. Award ‘Panglima Jasa Negara’ (P.J.N.) 2.6.2007
  - viii. Award ‘Sri Indera Mahkota Pahang’ (S.I.M.P.) 11.12.2008
8. Publications:  
Published more than 20 papers in referred local and international journals.

## **Dr Richard Jefferson**

### **CEO of CAMBIA, Australia**

Richard obtained a PhD in Molecular Biology at the University of Colorado, followed by an NIH fellowship at the Plant Breeding Institute in Cambridge where he was responsible for creating and distributing amongst the most widely cited and licensed plant biotechnologies. CAMBIA, an international non-profit institute based in Australia was founded in 1991 and is dedicated to development of tools and enabling technologies to promote equitable life sciences-enabled innovation worldwide.

The CAMBIA BiOS Initiative ([www.bios.net](http://www.bios.net)) - the biological open source movement is an integrated response to increasing science and technology complexity, patent thickets and innovation system inefficiencies. As part of this work, CAMBIA created the Patent Lens, ([www.patentlens.net](http://www.patentlens.net)), an independent, public-good global resource for increasing patent transparency.

Richard has worked and taught extensively in the developing world, supporting the Rockefeller Foundation's biotechnology network for over ten years, and has worked as senior staff for the FAO, and consultant for other UN Agencies. He has been profiled in media including The Economist, Newsweek, Nature Biotechnology and Red Herring. CAMBIA's work has recently featured in cover editorials in most major life sciences journals.

In 2003 he was named by Scientific American to the List of the World's 50 most influential technologists, cited as the World Research Leader for 2003 for Economic Development. Richard is an Outstanding Social Entrepreneur of the Schwab Foundation, for which is a regular panelist at the Davos meetings of the World Economic Forum.

### **Prof. Dr. Ridzwan A. Rahman**

**Dean, School of Sustainable Agriculture**

**Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia**

Ridzwan Abdul Rahman graduated with Diploma in Agriculture from University of Agriculture, Malaysia in 1974, Bachelor of Forestry from Louisiana State University in 1977, MSc (Marine Biology) from San Jose State University, California in 1981 and PhD in Marine Biology from University of Newcastle upon Tyne, United Kingdom in 1992.

He served University of Agriculture, Malaysia (UPM) from 1982 until 1995. In 1995, he joined Universiti Malaysia Sabah (UMS) and helped to establish the Borneo Marine Research Unit (BMRU). He headed BMRU beginning May 1996 and was made Director of Borneo Marine Research Institute in 2000.

Prof. Ridzwan initiated the aquaculture research programme in UMS in 1997 and was instrumental in the development of the multi-purpose marine hatchery in the University.

He was the Director of Research and Innovation Centre, managing research of the University between January 2006-December 2007. In January 2008, he was appointed as Dean, School of Sustainable Agriculture.

### **Prof. Dr. Nina V. Fedoroff**

**Science and Technology Adviser to the U. S. Secretary of State and to the Administrator of the U. S. Agency for International Development**

Dr. Fedoroff is the Willaman Professor of Life Sciences and Evan Pugh Professor in the Biology Department and the Huck Institutes of the Life Sciences, Pennsylvania State University.

Dr. Fedoroff is a leading geneticist and molecular biologist who has contributed to the development of modern techniques used to study and modify plants. She received her Ph.D. in molecular biology from the Rockefeller University in 1972. In 1978, she became a staff member at the Carnegie Institution of Washington and a faculty member in the Biology Department at Johns Hopkins University. In 1995, Dr. Fedoroff joined the faculty of the Pennsylvania State University, where she served as the founding director of the [Huck Institutes of the Life Sciences](#).

Dr. Fedoroff has done fundamental research in the molecular biology of plant genes and transposons, as well on the mechanisms plants use to adapt to

stressful environments. Her book, *Mendel in the Kitchen: A Scientist's View of Genetically Modified Foods*, published in 2004 by the Joseph Henry Press of the National Academy of Science, examines the scientific and societal issues surrounding the introduction of genetically modified crops.

Dr. Fedoroff is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and the European Academy of Sciences. She has served on the National Science Board of the National Science Foundation. Dr. Fedoroff is a 2006 National Medal of Science laureate.

Nina V. Fedoroff did her undergraduate work at Syracuse University, graduating summa cum laude with a dual major in biology and chemistry. She attended the Rockefeller University, where she earned her Ph.D. in molecular biology in 1972. Both her undergraduate research at Syracuse University and her graduate research on RNA bacteriophage at The Rockefeller University were supported by grants and fellowships from the National Science Foundation. Following graduation from The Rockefeller University, she joined the faculty at the University of California, Los Angeles (UCLA), and carried out research on nuclear RNA.

In 1974 Fedoroff received fellowships from the Damon Runyan-Walter Winchell Cancer Research Fund and the National Institutes of Health (NIH) for postdoctoral work, first at UCLA and then in the Department of Embryology of the Carnegie Institution of Washington in Baltimore. Working in the laboratory of Donald Brown, Fedoroff pioneered in DNA sequencing, determining the nucleotide sequence of the first complete gene. In 1978, Fedoroff became a staff member at the Carnegie Institution of Washington and a faculty member in the Biology Department at Johns Hopkins University. Her research focus changed to the isolation and molecular characterization of maize transposable elements. The isolation of the maize transposons, discovered genetically by Barbara McClintock in the 1940s, was achieved in the early 1980s. In subsequent years, Fedoroff's lab showed that the maize transposons were active in a variety of other plants, developed transposon tagging systems, and studied the epigenetic regulation of transposon activity.

In 1995 Fedoroff joined the faculty of the Pennsylvania State University as Willaman Professor of Life Sciences. From 1995 to 2002, she served as the Director of the Biotechnology Institute and she organized and served as the first Director of the Life Sciences Consortium (now the Huck Institutes of the Life Sciences), a seven-college organization devoted to the promotion of multidisciplinary research and teaching in the life sciences. In 2002, Fedoroff was named an Evan Pugh Professor of the Pennsylvania State University and in 2003, she became a member of the External Faculty of the Santa Fe Institute. Fedoroff's current work is directed at understanding the genetic organization and molecular dynamics of plant stress and hormone responses and makes use of DNA microarray expression profiling, reverse genetics, and theoretical approaches to the analysis of large data sets. Fedoroff has published two books and numerous papers in scientific journals.

Fedoroff has served on the editorial boards of the **Proceedings of the National Academy of Sciences**, **Science**, **Gene**, **Plant Journal** and **Perspectives in Biology and Medicine** and currently chairs the NAS Council's Publications Committee. She served on the board of the International Science Foundation and the International Scientific Advisory Board of the Englehardt Institute of Molecular Biology in Moscow. She has been a member of the Council of the National Academy of Sciences, the Board of Directors of the Genetics Society of America, the American Association for

the Advancement of Science, the Board of Trustees of BIOSIS and the National Science Board, which oversees the National Science Foundation. She is currently a member of the Science Steering Committee of the Santa Fe Institute and the Board of Directors of the Sigma-Aldrich Chemical Company.

Fedoroff has received several awards and honors, including an NIH Merit Award, a 10-year research grant that supported her work from 1989 to 1999. She also received the University of Chicago's Howard Taylor Ricketts Award in 1990, the New York Academy of Sciences' Outstanding Contemporary Woman Scientist award in 1992, and the Sigma Xi's McGovern Science and Society Medal in 1997, and Syracuse University's Arents Pioneer Medal in 2003. She is a member the American Academy of Arts and Sciences, the European Academy of Sciences, the American Academy of Microbiology and the National Academy of Sciences.

### **Dato' Dr. Choo Yuen May**

**Deputy Director General (R&D), Malaysian Palm Oil Board, Malaysia**

#### **Academic Qualification & Profesional Society:**

- B.Sc., M.Sc. with Honours (University of Waikato, New Zealand)
- Ph.D. (Chemistry) (University of Malaya)
- Executive MBA (Asian Institute of Management, Philippines)
- Fellow of (1) Academy of Science Malaysia, (2) Malaysian Oil Scientists' and Technologists' Association and (3) Malaysian Institute of Chemistry

#### **Work Experience:**

- Lecturer, Universiti Sains Malaysia (Jan. 1980 – June 1982)
  - Joined MPOB (then PORIM) as Research Officer (in July 1982)
  - Currently, Deputy Director-General (Research & Development) Malaysian Palm Oil Board (MPOB), overseeing R&D activities of palm oil in MPOB.
- Management and R&D experience.

#### **Research Thrust Areas:**

##### (1) Palm Biofuel

One of the pioneers working on Palm Biofuel programme since 1982. She is the project leader including commercialization aspect of the palm biodiesel (methyl esters) project – both normal and winter grades palm biodiesel. She also helped in the drafting of Malaysia's National Biofuel Policy which was released on March 2006. She has contributed much to the success of the Palm Biodiesel Program in Malaysia.

(2) She is also the project leader and involved directly as inventor in the development of novel, efficient and green processes for the palm-based industry pertaining to:

- Production of Carotenes Rich Red Palm Oil – trade name CAROTINO which has been marketed worldwide.

- Production of Palm Phytonutrients (carotenes, Vitamin E, Coenzyme Q, Sterols, Squalene, Phospholipids) from various palm sources.
  - Production of Monoglycerides as Emulsifiers and Anti-bacterial Agent
- (3) Other areas of R&D which she has initiated/directly contributed include :
- MPOB Bioenergy Projects including Second Generation Palm Biofuel, palm derived aviation fuel
  - Palm-Based Degreaser (already commercialized)
  - Palm Food Grade Lubricant (being commercialized)
  - Life Cycle Assessment of Oil Palm Supply Chain

**Publications:** About 550 including 40 patents

**Awards:** Received numerous awards at national (18 awards) and international (26 awards) level in recognition of her scientific and invention contributions.

## **Dr. Hirzun Mohd Yusoff**

**Sime Darby Technology Centre Sdn Bhd**

### **Background**

Age 38yrs, holds a Doctorate Degree in Molecular Genetics from Sheffield University, United Kingdom and BSc (Hons) Molecular Biology from University of Manchester, United Kingdom.

### **Experience**

Currently a Vice President I, Sime Darby Technology Center Sdn Bhd. Manages 3 departments including Bioprocessing Technology, Applied Chemistry and Agri-biotechnology. The department carries out research programs in various aspects of industrial biotechnology, applied chemistry/metabolic profiling and applied agriculture. In 2008, Dr Hirzun was entrusted to develop Sime Darby Model Paddy Farm and is also responsible to develop Sime Darby Seeds R&D Centre.

Previous post as a lecturer at the Biotechnology Department, Faculty of Food Science and Biotechnology, Universiti Putra Malaysia (1999-2003). Very much involved in the teaching of courses in biotechnology at undergraduate and postgraduate level and very active in research as well as consultancy work. R&D work includes wide area of interest including molecular genetics of yeast, production of recombinant biopharmaceutical and development and fermentation studies of recombinant microorganism.

Previous post include the coordinator of Fermentation Technology Unit under the Enzyme and Microbial Technology Laboratory, Institute of Bioscience, UPM, that are involved in cutting edge R&D and contract research work in fermentation technology and bioprocess engineering.

In 2000, appointed as consultant for the Science Advisor Office, Prime Minister Department to submit working paper that was subsequently approved by the Prime Minister for the set-up of a cGMP biotechnology plant for the production of recombinant biopharmaceutical with investment of RM75 million. The project is now known as Innobiologics Sdn Bhd.

## **Prof. Sayed Azam-Ali**

### **University of Nottingham, Malaysia Campus**

Professor Azam-Ali was Professor of Tropical Agronomy in the School of Biosciences at Sutton Bonington campus, where he ran the Tropical Crops Research Unit. The TCRU provides a focus for a broad range of multidisciplinary activities on tropical species that grow in hostile, marginal environments and for which the processes that limit productivity are least understood.

Professor Azam-Ali's research interests include tropical agriculture in relation to drought stress, and agricultural biodiversity and under-utilised crops.

## **Dato' Dr. A.H. Zakri**

### **Tuanku Canselor Chair**

### **University of Science Malaysia (USM)**

Dato' Zakri is currently the Tuanku Canselor Chair in University of Science Malaysia (USM). He was the Director of United Nations University-Institute of Advanced Studies in Japan. He was also the Co-Chair of the Millennium Ecosystem Assessment Board (2001-2005), a four-year U.N. study undertaken by 1,360 experts from 95 countries to assess the state of the world's ecosystems. He is Vice-President of the Third World Academy of Sciences (TWAS); member of the Board of Trustees of the Institute for Global Environmental Strategies (IGES); member of the ICSU-ISTS-TWAS Consortium ad hoc Advisory Group on 'Harnessing Science, Technology and Innovation for Sustainable Development'; member of the Academic Advisory Committee of the Arab Fund Fellowship Program; and member of the International Cosmos Prize Committee.

During the World Summit on Sustainable Development (WSSD) in August 2002 in Johannesburg, Zakri was the Deputy Head of the UNU delegation and coordinated the university's inputs in the preparatory meetings of the Summit. He led the UNU delegation to the meetings of the UN Commission on Sustainable Development at its 11th (2003), 12th (2004) and 13th (2005) sessions. He also led the university delegation to the seventh meeting of the Conference of Parties of the Convention on Biological Diversity in Kuala Lumpur in February 2004.

Zakri served as the Secretary General of the Society for the Advancement of Breeding Researches in Asia and Oceania (SABRAO) from 1981-89 and was a Deputy Vice-Chancellor of Universiti Kebangsaan Malaysia from 1992-2000. He was the Founding President (1994-2000) of the Genetics Society of Malaysia and Chairman of the National Task Force that prepared the National Policy on Biological Diversity that was launched by the Malaysian government in 1996. He was also the Founding Chairman (1999) of the National Genetic Modification Advisory Committee (GMAC Malaysia).

Zakri was an active and senior member of the Malaysian government delegation to negotiate the U.N. treaty, the Convention on Biological Diversity (CBD) (1990-1992), and subsequently a member of his country's delegation to the various meetings of the treaty's Conference of Parties (1993-2000). He chaired the CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) from 1997-99. He participated in meetings of UN bodies like the Food and Agriculture Organization (FAO) in Rome and the International Atomic

Energy Agency (IAEA) in Vienna. From 1999-2000, he was the Team Coordinator for the Asia-Pacific region in the UNDP/GEF project on “Capacity Development Initiative.”

A graduate of Michigan State University, USA (PhD, 1976), Prof Zakri’s interests include biodiplomacy, education for sustainable development and biotechnology and biodiversity policies for developing countries. During the last few years, he had given numerous keynote addresses and invited lectures on these subjects.

Recipient of a Fulbright-Hays Fellowship (1981), and a Gold Medal Award from the Rotary Research Foundation (1999), Zakri is a Founding Fellow of the Academy of Sciences Malaysia (1995), the Academy of Sciences of the Developing World (TWAS)(1996) and the World Academy of Art and Science (2003).

In 1998 he received the Langkawi Award, a national laureate for outstanding contribution in the field of environment in Malaysia. Three new species known to science are named after him: a beetle (*Paleosepharia zakrii*); a cicada (*Pomponia zakrii*), and a pitcher plant (*Nepenthes curtisii ssp. zakriana*).

## **Dr. Hassan Mat Daud**

**Director General, Agro-Biotechnology Institute (ABI), MOSTI**

**Putrajaya, Malaysia**

As the Director General of the Agro-Biotechnology Institute (ABI), MOSTI, he leads the national initiative on agro-biotechnology through the setting of R & D directions, designing strategies and developing action plans for implementation to achieve social-economic impact of agro- biotechnology on the agricultural sector of the country.

At international level, he represents the nation at various global and regional for a involving organizations such as UN, FAO, APEC, ACIAR and ISAAA.

Before joining MOSTI he was the Director of MARDI’s Biotechnology Center.

He obtained his PhD from Univ. of Missouri, Columbia, Missouri, USA in 1990.

MSc. (in Genetics) Washington State University, Pullman, Washington, USA (1979)

BSc. (in Genetics) University of California, Davis, California, USA (1977).

His research interest covers various areas of plant biotechnology including gene cloning and characterization.

## **Ahmad Helmi Abdul Halim,**

**Director, Technology Portfolio Management**

**MIMOS Bhd.**

Ahmad Helmi Abdul Halim is the Director of Technology Portfolio Management of MIMOS since September 2006. His key duties are to lead the team that set the Technology Portfolio planning and disbursement to the market for commercialisation. His team plays a pivotal role in articulating market inputs, development the strategies for technology development and deployment.

Helmi holds B.Sc. in Electrical Engineering from the University of Missouri at Columbia, Post Graduate Diploma in Business Administration from the University of Nottingham and Executive Training from the INSEAD. To-date, Helmi has disclosed one patent patented in the United States, India, Taiwan Province of China and Japan patent office and another two inventions pending at MyIPO.

Helmi has more than 20 years of experience in various disciplines including Research & Development, Technical Operations, Business Planning, Business Development, Product Marketing & Management, Regulatory Management, Sales Management, Strategic Planning and Technology Entrepreneur. Helmi's has also international professional exposures including job assignments based in Japan, USA, Indonesia, Singapore, Hong Kong and the Islamic Republic of Iran.

## **P. Ragu**

General Manager Research & Development

Federal Land Consolidation and Rehabilitation Authority (*FELCRA*)

Date of Birth: 27 May 1958

Qualification: B. Sc(Agric) UPM, MBA(University of Newcastle, Aust)

Working experience

1983 – 1989: FELCRA: Regional Agriculture Officer

1990 - 1995: FELCRA: State Agriculture Officer(Kelantan)

1996 – 1999: FELCRA: Plantation Visiting Agent

2002 - 2004 : FELCRA Plantation Services Sdn Bhd. Consultant.

2005 – 2008: FELCRA Vice President of Research & Development