



S&T Newsletter



A Quarterly of the
Centre for Science and Technology of the Non-Aligned
and Other Developing Countries (NAM S&T Centre)

VOL. 23, No. 3
OCTOBER - DECEMBER 2013

From the Director'S Desk

SEASON'S GREETINGS for a Happy and Prosperous
New Year 2014!!



The year 2013 witnessed several significant landmark achievements for the NAM S&T Centre. With Venezuela joining the Centre, the Centre's membership strength went to 47. The 13th Meeting of the Governing Council of the Centre was held in Sandton City, Johannesburg in September 2013, when South Africa

took over as the President of the Centre, and India and Malaysia were elected to the office of the Vice-President. The Centre launched a new Fellowship scheme - 'Research Training Fellowship for Developing Country Scientists (RTF-DCS)' - sponsored by the Government of India and during April - December 2013 twenty researchers from 19 developing countries successfully completed their ~6 months' affiliation with India's prestigious academic and R&D institutions. The Centre organised 4 international workshops/conferences in India, Indonesia, Nepal and Uganda, respectively on Women Empowerment, Nanotechnology, Microhydel and Lightning Protection, and published 5 books on Energy Audit, Lightning Protection, Science Centres, New & Advanced Materials and Nanotechnology. The Centre also successfully continued to implement its Fellowship schemes on Tropical Coastal Marine Ecology & Biogeochemistry, Natural Products Chemistry and Food Science & Technology in German, Pakistan and Indian Centres of Excellence.

The response to our announcement for RTF-DCS 2013-14 has also been highly encouraging. The final selection of 20 Fellows out of 249 applications received from 44 developing countries was made on 20th December 2013 by an International Selection Committee (ISC) represented by H.E. Mrs. Gennet Zewdie, Ambassador of Ethiopia to India; Prof. Lidia Szpyrkowicz, Scientific Counsellor, Embassy of Italy in India; Prof. P.K. Gupta, DG, NAFEN; and Heads of International Cooperation Divisions of various scientific Departments of the Government of India.

An international workshop on Nanotechnology: Transferring Nanotechnology Concept towards Business Perspectives (IWoN-2013) held in Serpong, Indonesia during 2-5 October 2013 was attended by 104 professionals and researchers from 33 countries. The event got concluded with unanimous adoption of 'Serpong Recommendations - 2013 on Transferring Nanotechnology Concept towards Business Perspectives'.

The Centre announces an international workshop on 'Sustainable Energy for All - Transforming Commitments to Action', which will be held in Bengaluru, India on 22-24 February 2014 and I earnestly invite the interested scientists and professionals to take part in knowledge sharing in this highly important subject.

Happy Reading!


(Arun P. Kulshreshtha)

Centre Organised

International Workshop on
NANOTECHNOLOGY (IWoN) 2013:
Transferring Nanotechnology Concept towards Business Perspectives
Serpong, Indonesia, 2-5 October 2013

Nanotechnology is the art, science and technology of manoeuvring the matter on an atomic and molecular scale. In the nanometer scale (10⁻⁹ m), materials tend to exhibit unique properties as compared to those in bulk scale. Within last decade, this aspect is increasingly being extensively exploited in almost all diverse fields and has led to a scientific and industrial revolution of the 21st Century. There is a Nano Movement all over the globe and Nano is fast becoming a household word and a culture. The scope of Nanotechnology is ever expanding and has already covered the industries like electronics, medical, pharmaceutical, cosmetics, food, textiles, ceramics etc. For example, nanotechnology development in computers has not only led to much more compact size, but has also enabled improvement of its capability and capacity to solve giant programmes in much shorter period. World-wide, nanotechnology was incorporated into manufacturing goods worth over \$30 billion in 2005 and the projections for 2015 indicate business worth over \$2.6 trillion.

No country would like to be left behind in accruing the benefits of this emerging field. For developing countries, nanotechnology can open up new opportunities for rapid progress in priority areas. A nation's capacity to benefit from such revolutionary technology development will however depend on the prevailing institutional and human capacities and the embedded social culture of innovation and entrepreneurship. Successful research and technology transfer activities will be possible only through cooperative endeavours between developed and developing countries and between public and private institutions. Developing countries must determine which specific technologies and advancements will address their unique economic, social and environmental needs so that they could benefit from working with other countries and institutions to develop, adapt and transfer innovative improvements across many application areas.

Although nanotechnology is in its infancy, it is the right time to explore its exploitation by the developing countries according to a well planned long term perspective. In order to explore the wider prospects and share the best practices on transferring Nanotechnology for industrial applications in the developing countries, the



Inauguration of IWoN - 2013

(Contd. on page 2 col. 1)



(Contd. from Page 1 - Nanotechnology, IWoN-2013, Indonesia)

Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre) jointly with the Ministry of Research and Technology (RISTEK), Government of Indonesia and the Indonesian Institute of Sciences (LIPI), and in collaboration with Indonesian Society for Nanotechnology, organized an **'International Workshop on Nanotechnology (IWoN) 2013: Transferring Nanotechnology Concept towards Business Perspectives'** in Serpong, Indonesia during 2-5 October 2013.

The Inaugural Session started with opening by the master of ceremony and a traditional performance from Kalimantan. This was followed by the Report Speech of Dr. Nurul Taufiku Rochman, Chairperson of the Workshop Organising Committee. After the welcome address by Prof. Dr. Lukman Hakim, Chairman of LIPI, Prof. Dr. Arun P. Kulshreshtha, Director & Executive Head, NAM S&T Centre presented the genesis of the event and also briefly described the activities of the Centre. Since H.E. Prof. Dr. Ir. Gusti M. Hatta, Honourable Minister for Research and Technology (RISTEK), Republic of Indonesia could not personally inaugurate the Workshop due to unforeseen commitments, his Key Note address was read by Dr. Mulyanto, Honourable Deputy Minister for Science & Technology Institutions in RISTEK. This was followed by Conferment Token of Appreciation from the Honourable Deputy Minister to the Director of NAM S&T Center, and Conferment Book of "300 Doktor Nano" from the Chairperson of the Organising Committee to the Honourable Deputy Minister, Chairman of LIPI and Director of the NAM S&T Center. The session was concluded with the photo sessions and a press conference with the Honourable Deputy Minister, Chairman LIPI, Director NAM S&T Center and Dr. Nurul Taufiku Rochman / Prof. Dr. Silvester Tursiloadi of the Organising Committee.

104 experts, professionals, researchers and administrators from 33 countries including Australia, Cambodia, China, Egypt, The Gambia, Hong Kong, India, Indonesia, Iran, Iraq, Japan, Kenya, Republic of Korea, Madagascar, Malawi, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, Pakistan, South Africa, Sri Lanka, Sudan, Taiwan, Tanzania, Thailand, Togo, Uganda, Venezuela, Vietnam, Zambia and Zimbabwe, of which 24 (underlined) were the member countries of the NAM S&T Centre, attended this international workshop. Of these, 30 participants were sponsored by the NAM S&T Centre; a resource person was

invited from Japan; 31 researchers from 11 countries were from the Asia Nano Forum Society (ANF), Singapore sponsored under Asia Nanotech Camp (ANC); and 35 participants were from Indonesian R&D and academic institutions.

The overseas participants sponsored by the NAM S&T Centre were from Cambodia [Dr. Keo Lychek, In Charge of Master's Programme GEE, Electrical Engineering, Institute of Technology of Cambodia, Phnom Penh]; Egypt [Prof. Dr. Emad Abdel Salam Abdel Moaty Mostafa, Head, Biomaterials Department, National Research Centre, El Dokki, Cairo; and Prof. Khaled Ebnalwaled, Associate Professor, Crystalline and Nanomaterials Measurements (CNM) Lab, Department of Physics, Faculty of Science, South Valley University, Qena]; The Gambia [Mr. Lamin Ceesay, Senior Science & Technology Officer, Ministry of Higher Education, Research, Science and Technology, Kotu]; India [Prof. V. Murugan, Principal, Dayananda Sagar College of Pharmacy, Bangalore; and Ms. Parul Sehgal, Research Assistant, NAM S&T Centre, New Delhi]; Iran [Dr. Hojatollah-Hajihoseini Sefideh, Director, Research Institute for New Technologies, Iranian Research Organization for Science and Technology (IROST), Ministry of Science, Research and Technology (MSRT), Tehran]; Iraq [Mrs. Kifah A. Fayad AL-Imarah, Director, Renewable Energy Directorate / Hydrogen and Biofuel Department, Ministry of Science and Technology, Baghdad]; Kenya [Dr. Naumih Noah, Chemistry Lecturer, Kenyatta University, Nairobi]; Madagascar [Mr. Hery Andrianiaina, Permanent Secretary of CORANANO, Department of Maintenance & Instrumentation, Institute National Des Sciences et Techniques Nucleaires (INSTN), Antananarivo]; Malawi [Dr. Timothy Tiwonge Biswick, Senior Lecturer, University of Malawi, Zomba]; Malaysia [Dr. Abdul Kadir Masrom, Under Secretary, Ministry of Science Technology and Innovation, Putrajaya]; Mauritius [Prof. Dhanjay Jhurry, National Research Chair, Mauritius Research Council, Center for Biomedical and Biomaterials Research, ANDI Centre of Excellence, Réduit]; Myanmar [Dr. Lwin Thuzar Shwe, Deputy Director, Foreign Scholar Section, Ministry of Science and Technology, Nay Pyi Taw]; Nepal [Dr. Suresh Kumar Dhungel, Senior Officer, Nepal Academy of Science and Technology (NAST), Khumaltar, Lalitpur]; Nigeria [Engr. Timothy Oladele Odedele, Assistant Director, New and Advanced Materials, Raw Materials Research



Group Photo during Inauguration of IWoN - 2013



(Contd. from Page 2 - Nanotechnology, IWoN-2013, Indonesia)



Foreign Participants of IWoN - 2013

& Development Council (RMRDC), Abuja; and Mr. Ojo Olusola Emmanuel, Research Officer, Federal Institute of Industrial Research (FIRO). Lagos]; Pakistan [Dr. Shahzad Alam, Director General, PCSIR Laboratories Complex, Lahore; and Prof. Qamar ul Wahab, IT Chair Professor, Electronic Design Centre, Faculty of Electronics and Computer Engineering, NED University of Engineering and Technology, Karachi]; South Africa [Dr Robert Tshikhudo, Head, Mintek Nanotechnology Innovation Centre (NIC), Randburg; and Prof. M. Maaza, UNESCO UNISA AFRICA Chair in Nanosciences / Nanotechnology, iThemba LABS - National Research Foundation of South Africa, Somerset West, Western Cape Province]; Sri Lanka [Dr. Iresha Renuka Menike Kottegoda, Head and Principal Research Scientist, Industrial Technology Institute, Colombo]; Sudan [Prof. Dr. Eltayeb Edris Eisa Ebrahim, President, Sudan Academy of Sciences (SAS), Ozone Park, Khartoum]; Tanzania [Dr. Egid B. Mubofu, Senior Lecturer and Head, Department of Chemistry, University of Dar-es-Salaam]; Togo [Mr. N'konou David Kokou

for Institute of Technology of Cambodia' by Dr. Keo Lychek of Cambodia; 'Functional and Potential Aspects of Ceramic Nanoparticles' by Prof. Dr. Emad Abdel Salam AbdelMoaty Mostafa of Egypt; 'Pressure Dependence of Conduction Mechanism and Microstructure Properties of Nanocrystalline CdS' by Prof. Khaled Ebnalwaled of Egypt; 'Potentials of Nanotechnology Application in the Gambia' by Mr. Lamin Ceessay of The Gambia; 'Formulation and In Vitro Evaluation of Albumin Nanoparticles containing Temozolomide' by Dr. V. Murugan of India; 'Transferring Nanotechnology Concept for Industrial Use: Applications of Nanotechnology for Agriculture, Food and Medicine' by Ms. Parul Sehgal of India; 'Iran Nanotechnology Initiative' by Dr. Hojatolah- Hajihoseini Sefideh of Iran; 'Nanotechnology in the Production, Storage and Utilization of Renewable Hydrogen Energy' by Mrs. Kifah A. Fayad Al-Imarah of Iraq; 'Nano-Remediation of Carcinogenic Hexavalent Chromium using Palladium Nanoparticles' by Dr. Naumih Noah of Kenya; 'Madagascar Nanotechnology Initiative Program' by

Kekeli Mawunyegan, Ph.D. Student in Materials Science, Department of Physics, University of Lomé]; Uganda [Prof. Obwoya Kinyera Sam, Associate Professor, Kyambogo University]; Venezuela [Dr. Anwar Salem Hasmy Aguilar, Director, Venezuelan Nanotechnology Network, Universidad Simón Bolívar, Caracas]; Vietnam [Prof. Pham Duc Thang, Dean, Faculty of Engineering Physics and Nanotechnology, Laboratory for Micro and Nanotechnology, University of Engineering and Technology, Vietnam National University, Hanoi]; Zambia [Mr. Benson Banda, Principal Education Officer, National Science Centre, Ministry of Education, Science, Vocation Training and Early Education, Lusaka]; Netherlands]. The NAM S&T Centre was represented during the Workshop by Prof. Arun P. Kulshreshtha, Director & Executive Head for planning and organising the event.

The overall programme of the Workshop was conducted in seven sessions including one plenary, five technical and one concluding and valedictory session, respectively co-chaired by: Prof. Dr. Silvester Tursiloadi (Indonesia) and Prof. Dr. Eltayeb Edris Eisa Ebrahim (Sudan); Prof. M. Maaza (South Africa) and Mrs. Kifah Al Imarah (Iraq); Dr. V. Murugan (India) and Prof. Pham Duc Thang (Vietnam); Prof. Dr. Emad AbdelSalam AbdelMoaty Mostafa (Egypt) and Prof. Qamar ul Wahab (Pakistan); Prof. Khaled Ebnalwaled (Egypt) and Prof. Dhanjay Jhurry (Mauritius); Prof. Obwoya Kinyera Sam (Uganda) and Dr. Anwar Salem Hasmy Aguilar (Venezuela); and Dr. Nurul Taufiqu Rahman (Indonesia) and Dr. Hojatolah Hajihoseini Sefideh (Iran).

Plenary talks were given by Dr. Yuya Oaki, Assistant Professor, Department of Applied Chemistry, School of Integrated Design Engineering, Faculty of Science and Technology, Keio University, Yokohama, Japan and Mr. Ragil Yoga Edi, Head, Sub Division of IP Registration and Protection, Center of Innovation, Indonesian Institute of Sciences (LIPI).

The scientific papers presented by the foreign participants during the Workshop were on 'Nanotechnology: The Future Development Plan

(Contd. on page 4 col. 1)



(Contd. from Page 3 - Nanotechnology, IWoN-2013, Indonesia)



Mr. Hery Andrianiaina of Madagascar; 'Multi-Metallic Sulphide Catalysts for Ultra-deep Hydrodesulphurisation of Diesel Fuels' by Dr. Timothy Tiwonge Biswick of Malawi; 'Nanotechnology Contribution as Economic Driver in Malaysian Economic

Transformation Program' by Dr. Abdul Kadir Masrom of Malaysia; 'Nanomedicine Research at the Centre for Biomedical and Biomaterials Research' by Prof. Dhanjay Jhurry of Mauritius; 'Preparation of CuO Nanoparticles by Precipitation Method' by Dr. Lwin Thuzar Shwe of Myanmar; 'Institutionalizing Nanotechnology in Nepal' by Dr. Suresh Kumar Dhungel of Nepal; 'Barriers to Nanotechnology Transfer Towards Business Perspectives' by Engr. Timothy Oladele Odedele of Nigeria; 'Characterisation of Some Nigeria Limestone for Production of Nano Precipitated Calcium Carbonate' by Mr. Ojo Olusola Emmanuel of Nigeria; 'Status of Nano-technology in Pakistan: Threats and Opportunities' by Dr. Shahzad Alam of Pakistan; 'Wide Bandgap Semiconductor based Nano-structured Electronics and Photonics' by Prof. Qamar ul Wahab of Pakistan; 'Development and Industrialisation of Advanced Nanoparticle Systems and Devices for Health and Water Applications' by Dr Robert Tshikhudo of South Africa; 'Solar Energy R&D Landscape and Solar Energy Roadmap of South Africa: Nano Opportunities' by Prof. M. Maaza of South Africa; 'Status of Development of Nanotechnology based Value Added Products' by Dr. Iresha Renuka Menike Kottegoda of Sri Lanka; 'Nano Science & Nano Technology Program in Sudan' by Prof. Dr. Eltayeb Edris Eisa Ebrahim of Sudan; 'Synthesis and Characterization of Anacardic Acid-capped Chalcogenide Nanoparticles' by Dr. Egid B. Mubofu of Tanzania; 'Synthesis of Intrinsic and Aluminum-doped Zinc Oxide (ZnO) Nanoparticles as a Buffer Layer in Organic Solar Cells by Chemical Bath Deposition Method' by Mr. N'konou Kokou Kekeli Mawunyegan of Togo; 'Status of Nanotechnology in Uganda' by Prof. Obwoya Kinyera Sam of Uganda; 'Nanotechnology in Venezuela: Current Situation and Perspective' by Dr. Anwar Salem Hasmy Aguilar of Venezuela; 'Nanotechnology: Research and Development in Vietnam' by Prof. Pham Duc Thang of Vietnam; 'The Challenge of Nanotechnology among Teachers in Zambia: A Theoretical Perspective' by Mr. Benson Banda of Zambia; 'From Laboratory to Market: The Challenges of Transferring Nanotechnology Concept towards Business Perspectives' by Mr. Trust Saidi of Zimbabwe.

Three scientific papers presented by Indonesian scientists were on 'Development of Nano-Structured Intercalation Catalyst from Ion-Exchangable Inorganic Layered Compounds toward Green Oxidation Reactions' by Dr. Indri Badria Adilina of the Research Center for Chemistry, Indonesian Institute of Sciences (LIPI); 'The Structure and Adsorption Properties of Annealed-Reduced Graphene Oxide' by Dr. Fitri Khairunisa of the Chemistry Department, Indonesia University of Education, Bandung; and 'Cellulose Nano fibre Isolation from Sludge from Pulp and Paper Industry' by Dr. Dian Susanthi of the Department of Chemistry, Bogor Agricultural University, Dramaga.

During the Concluding and Valedictory Session chaired by Dr. Nurul Taufiqu Rahman of Indonesia and Dr. Hojatolah Hajihoseini Sefideh of Iran, Prof. Dr. Arun P. Kulshreshtha, Director, NAM S&T Centre made a presentation on 'The Role of the NAM S&T Centre for South – South Cooperation in Science & Technology'. Subsequently, there was considerable discussion and debate to generate a set of recommendations titled 'Serpong Recommendations on Transferring Nanotechnology Concept towards Business Perspectives', and this document was unanimously adopted during the Closing Session. The Workshop ended with the handing over of the Certificates to the participants and concluding remarks by Prof. Dr. Silvester Tursiloadi.

The last day of the event was dedicated to a day-long field visit by the foreign participants to the Research Center PUSPIPTEK, Serpong, Taman Mini Indonesia Indah (TMII), Museum Indonesia, NAM Monument and Keong Mas.

The participants thanked the organisers for the successful and fruitful organisation of the Workshop and for excellent hospitality and arrangements made for the delegates, and unanimously hoped that more similar events will be held in future with a focus on South-South cooperation.



Group Photo of Asia Nano Forum and Indonesian Society for Nano Participants of IWoN - 2013

PARTICIPATION OF CENTRE'S SCIENTISTS IN WORKSHOPS/SEMINARS/CONFERENCES

29 Nov 2013

Mrs. Pinky Singh and Ms. Parul Sehgal, Research Assistants attended the Annual Stree Shakti Samman Award Ceremony in New Delhi in the presence of Hon. Kumari Selja, Union Minister for Social Justice & Empowerment of India.

17-18 Dec 2013

Mrs. Pinky Singh and Ms. Subhashree Basu, Research Assistants attended the South Asia Conference on 'Food Innovation, Climate Change, Rapid Urbanisation and Skills Development' organised by The Energy and Resource Institute (TERI), New Delhi.



Serpong Recommendations

ON TRANSFERRING NANOTECHNOLOGY CONCEPT TOWARDS BUSINESS PERSPECTIVES

WHILE EXPRESSING gratitude to the Ministry of Research and Technology (RISTEK), Government of Indonesia, Indonesian Institute of Sciences (LIPI) and Indonesian Society for Nano, as well as to the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) for organizing the International Workshop on Nanotechnology (IWoN 2013): "Transferring Nanotechnology Concept Towards Business Perspectives", which was held at PUSPIPTEK, Serpong, Indonesia during 2-5 October 2013,

HAVING BEEN CONVINCED that the future technical and economic prosperity of the countries lies among others, in the promotion of Nanoscience and Nanotechnology and their applications for industrial use to enrich and strengthen the socio-economic status of the Non Aligned Member States and other developing countries,

BY SHARING the experiences in Non Aligned and other developing countries through the presentation of their country case studies on the current status of research and development in the field,

RECOGNIZING that nanotechnology cuts across multiple disciplines such as agriculture and food, biotechnology, medicine, health, new materials, water and air purification, environmental sensing and protection, energy generation, among others, and that by exploiting the same the developing countries can create wealth to enhance the quality of life of their people,

HAVING CONSIDERED the present status and future prospects on nanotechnology in developing countries with particular focus on Materials and Processes; and potentials of industrial applications of Nanotechnology for Health, Food and Agriculture, Electronic Devices, Energy and Environment, notwithstanding the human capital development;

THE PARTICIPANTS FROM CAMBODIA, EGYPT, THE GAMBIA, INDIA, INDONESIA, IRAN, IRAQ, KENYA, MADAGASCAR, MALAWI, MALAYSIA, MAURITIUS, MYANMAR, NEPAL, NIGERIA, PAKISTAN, SINGAPORE, SOUTH AFRICA, SRI LANKA, SUDAN, TOGO, TANZANIA, UGANDA, VENEZUELA, VIETNAM, ZAMBIA AND ZIMBABWE EXPRESSED that the deliberations of the IWoN 2013 were a resounding success in sharing of knowledge and at the end of which the following recommendations and actions were made for adoption by the participating countries in formulating their policies and action plans for the development of Nanoscience and Nanotechnology for industrial applications, and

UNANIMOUSLY RESOLVED THAT:

- Emphasis should be laid on commercialization of nanoproducts to achieve socio-economic progress.
- The implementation, regulatory, ethical, standardization and Intellectual Property Rights (IPR) issues of nanoscience and nanotechnology should be properly addressed.
- Developing countries should promote need-based R&D activities and encourage entrepreneurship.
- Develop innovative strategies in bringing academia and R&D Institutions together with industries for mutual understanding in promoting business perspectives to tune R&D activities to the requirements of the industry which primarily aims at marketing and profit making.
- Create awareness among the masses regarding nanotechnology through electronic and print-media.
- A database of nanoscientists and nanotechnologists among the NAM and other developing countries be created and a society be formed under the umbrella of the NAM S&T Centre. The Indonesian Society for Nano has the mandate to spearhead this cause. The Society will further encourage the bilateral, regional and multilateral collaborations to enhance global partnerships and networking of international linkages.

The participant from Bolivarian Republic of Venezuela proposed to organize an International workshop related to nanotechnology with participation of the member countries of the NAM S&T Centre and other developing countries jointly with the NAM S&T Centre, subject to necessary approvals of the competent authorities, with date, venue, etc., to be mutually decided.

The participant from the Republic of Mauritius made a similar proposal.

The participants of the workshop heartily welcomed the above proposals.

**THUS RESOLVED AND ADOPTED ON THE 3rd OCTOBER 2013 AT PUSPIPTEK,
SERPONG, INDONESIA.**

*RTF-DCS Fellowship Scheme 2013-14***CENTRE CONGRATULATES RTF-DCS RESEARCH FELLOWS
SELECTED FOR 2013-14**

In response to the announcement for Research Training Fellowship for Developing Country Scientists (RTF-DCS) for 2013-14 circulated by the Centre, 249 applications were received from 44 developing countries, out of which 151 applications were found eligible according to the Guidelines of the Scheme. The International Selection Committee (ISC) comprising H.E. Mrs. Gennet Zewdie, Ambassador of Ethiopia to India; Prof. Lidia Szpyrkowicz, Scientific Counsellor, Embassy of Italy in India; Prof. P.K. Gupta, Secretary General, National Foundation of Indian Engineers (NAFEN); Dr. Mukesh Kumar, Head, International Health Division, Indian Council of Medical Research



H.E. Mrs. Gennet Zewdie and Prof. Dr. Lidia Szpyrkowicz



Dr. Mukesh Kumar, Dr. Amitava Bandopadhyay, Mr. M. Bandyopadhyay and Ms. Parul Sehgal



Prof. P.K. Gupta



Smt. Sadhana Relia and Mrs. Ruckmani



Prof. Arun P. Kulshreshtha, Ms. Subhashree Basu and Mrs. Pinky Singh

RTF-DCS International Selection Committee Meeting in progress

(ICMR); Dr. Amitava Bandopadhyay, Head, International Science & Technology Affairs Directorate (ISTAD), Council of Scientific & Industrial Research (CSIR), India; Mrs. Sadhana Relia, Head, International Multilateral and Regional Cooperation Division (IMRCD) & Scientist 'G', Department of Science & Technology (DST), Government of India; and Mr. M. Bandyopadhyay, Senior Expert & Administrative Officer, NAM S&T Centre (Member-Secretary) in its meeting on 20th December 2013 selected the following 20 researchers for the award of the Fellowship under RTF-DCS for the year 2013-14; The name of the academic/R&D institute is also indicated for each selected Fellow.

Dr. Bach Thi Mai Hoa (Vietnam) for Adyar Cancer Institute, Chennai; Mr. Abdi Abera Tilahun (Ethiopia) for Forest Research Institute (FRI), Dehradun; Mrs. Pratima Pandey (Nepal) for Indian Institute of Horticultural Research (IIHR), Bengaluru; Ms. Nicole Michelle Tayler Sucre (Panama) for International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi; Ms. Vu Anh Thu (Vietnam) for Birbal Sahni Institute of Palaeobotany (BISP), Lucknow; Mr. Kekeli David N'konou (Togo) for Karunya University, Coimbatore; Mr. Bomba Tatsinkou Francis Desire (Cameroon) for Birla Institute of Technology & Science (BITS), Hyderabad Campus; Mrs. Anjuman Ara Begum (Bangladesh) for Jadavpur University, Kolkata; Ms. Bhamini Kamudu (Mauritius) for National Council of Science Museums (NCSM), Kolkata; Mrs. Neel Kamal Koju Duwal (Nepal) for National Metallurgical Laboratory (NML), Jamshedpur; Prof. Pablo J. Tamiozzo (Argentina) for Indian Veterinary Research Institute, Izatnagar; Ms. Sivanaswari Chalaparmal (Malaysia) for Sathyabama University, Chennai; Mr. Nanoukon Innocent Dossou Aminon (Benin) for Directorate of Sorghum Research, Hyderabad; Ms. Sadia Siddiqui (Pakistan) for Institute of Forest Genetics and Tree Breeding, Coimbatore; Mr. Amadou Hamadoun Dicko (Mali) for Tropical Forest Research Institute, Jabalpur; Dr. AbdelGawad Mohammed AbdelGawad Saad (Egypt) for Central Institute of Post Harvest Engineering & Technology, Ludhiana; Mr. Mbo Kacou Antoine Alban (Ivory Coast) for Central Plantation Crops Research Institute, Kasaragod, Kerala; Mr. Migbar Assefa Zeleka (Ethiopia) for Indian Institute of Technology (IIT), Roorkee; Ms. Kresensia Denis Mtweve (Tanzania) for Indian National Centre for Ocean Information Services (INCOIS), Hyderabad; and Ms. Deepani Upeka Rajawardhana (Sri Lanka) for National Dairy Research Institute (NDRI), Karnal.



President, NAM S&T Centre Visits the Centre

Mr. Mmboneni Muofhe, Deputy Director General, International Cooperation and Resources, Department of Science & Technology (DST), South Africa, who represents the Government of the Republic of South Africa as the President of the NAM S&T Centre, visited the Centre on 13th Dec 2013 to review the activities of the Centre and discuss matters concerning the promotion of South-South Cooperation in Science & Technology.



NAM S&T Centre - ICCBS Fellowship

Sri Lanka - Project Completion Report of Mrs. W.J.A. Banukie Nirosha Jayasuriya



Mrs. W.J.A. Banukie Nirosha Jayasuriya, Lecturer (Probationary) Bachelor of Pharmacy Degree Programme, Department of Medical Education and Health Sciences, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka was affiliated with the International Center for Chemical and Biological Sciences (ICCBS), HEJ Research Institute of Chemistry, University of Karachi, Pakistan from 8th November 2012 to 1st June 2013 as a Doctoral Research Fellow under the Joint NAM S&T Centre – ICCBS Fellowship Scheme. While at ICCBS, Mrs. Jayasuriya worked on a project titled 'Oral Hypoglycaemic and Anti-inflammatory Activity of *Pleurotus* Mushrooms' under the supervision of Prof. Dr. Muhammad Iqbal Choudhary, Director, ICCBS.

The research of Mrs. Jayasuriya was aimed at examining the extracts of *P. ostreatus* by screening them for bioassay activities - antibacterial, antifungal, antioxidant, antiglycation, cytotoxicity and anti-inflammatory. Antioxidant activity was screened by DPPH radical scavenging assay, superoxide anion radical scavenging assay and nitric oxide radical scavenging assay. Luminol-enhanced chemiluminescence assay was performed to study the *in vitro* anti-inflammatory activity of the hexane, dichloromethane and remaining aqueous fraction of acetone extract of *P. ostreatus*. A higher anti-inflammatory activity of aqueous fraction of acetone extract of *P. ostreatus* was observed when compared with other fractions. Aqueous fraction of acetone extract of *P. ostreatus* was further fractionated using size exclusion, normal phase column chromatography and recycling HPLC techniques. Spectroscopic analysis of the isolated compounds was done by MS, ¹HNMR, ¹³CNMR and 2DNMR (COSY, NOESY, HMBC, HMQC). A disaccharide, a derivative of uridine, N¹⁰ isopentenyl adenosine, niacinamide and uracil were isolated from *P. ostreatus*. The derivative of uridine and the N¹⁰ isopentenyl adenosine compounds possessed significant (P<0.05) anti-inflammatory activity in Wistar rats.

During her research period, Mrs. Jayasuriya also attended the 4th International Symposium-cum-Training Course on Molecular Medicine and Drug Research (7-10 January 2013) and presented a research paper titled 'Effect of Long Term Administration of *Pleurotus ostreatus* and *P. cystidiosus* Mushrooms on Serum Glucose Levels of Diabetic Wistar Rats'.



SCIENCE AND TECHNOLOGY NEWS IN THE DEVELOPING WORLD

Brazil: Bioluminescent Enzyme

It is well known that light generation in live organisms, or bioluminescence, is only possible because of a group of enzymes called luciferases. For decades, however, scientists have attempted to discover how the evolution of these enzymes occurred, that is, how an enzyme that did not produce light became luminescent. For the first time, researchers at Universidade Federal de São Carlos (UFSCar/Sorocaba) found this to have occurred in an enzyme considered to be a 'distant cousin' of the luciferases. The enzyme is involved in the excretory system of the non-luminescent larvae of the Zophobas morio beetle, widely used as fish bait and known as mealworms or tenebrio. Despite its lack of luster, the enzyme in the larval excretory system emits a very weak light when combined with luciferin from firefly (which the larvae do not possess). The quantity of light is so low that it is not considered luminescent; however, the molecular structure of the enzyme is similar to that of luciferase enzymes, placing it in the same family of enzymes. This distant cousin of the luciferases, now considered to be a link between the non-luminescence of the past and modern luciferases, is part of a larger group of enzymes called AMP/CoA-ligases, an ancient class found in all organisms and involved in the metabolism of organic acids. They are essential enzymes for all organisms, but their functions vary, depending on the tissue, organ or organisms in which they are found. In plants, for example, some of these enzymes are responsible for the process of pigmentation. In bacteria, they are involved in the metabolism of toxic compounds. In animals, the majority participate in the metabolism of fat. In fireflies, they produce light. The researchers discovered a structural 'switch' that transformed AMP-ligase enzymes, until then dark, into luciferases, producers of light. With this, they managed to produce a completely new orange-colored luciferase light based on an AMP-ligase, and also which amino acids should be changed to make the enzyme emit enough light to be considered luminescent. Thus although the color is not a novelty, the accomplishment is unprecedented because for the first time, a non-luminescent enzyme could be transformed into an enzyme that can generate light using genetic engineering, which became possible only because of the discovery of an enzyme considered the 'lost link' in the evolution of animals that emit light, such as fireflies, jelly fish and some beetles. This study also paves the way for the development of bioluminescent AMP-ligases, luminous biosensors for toxic organic acids, for example, to determine whether an insect is resistant to a given insecticide of an acidic nature (recall that AMP-ligases, including luciferases, act on acidic compounds, detoxifying them in some cases), and luciferases that emit in several more intense colors than other enzymes. Luciferases are broadly used as biomarkers, capable of helping in the detection of pathogenic cells, processes of infection and even the discovery of new drugs.

Source: Agência FAPESP, 23rd October 2013
[Biochemistry - American Chemistry Society Journal]

Burundi: International Rice Research Institute – A New Research Hub

Burundi has turned its rice research capacity up a notch to improve food security in Eastern and Southern Africa by establishing a regional rice research and development hub with the International Rice Research Institute (IRRI). The vision is for Burundi to become a leading regional hub for excellent, high yielding, rice varieties that also have good grain quality, to provide sustainable methods of growing rice to improve the well-being of rice producers and consumers, to reduce poverty and to preserve the environment. The new regional office at Gihanga named after IRRI's current Director General, Dr. Robert S. Zeigler, will focus on developing and testing new rice varieties matched to the different rice production ecologies across Eastern and Southern Africa. In 2011, two IRRI-bred rice varieties, Vuninzara (IR77713) and Gwizumwimbu (IR79511), which were developed especially for Burundi, were released. Farmers rank these varieties higher in grain quality of unmilled, milled, and cooked rice than previously popular varieties. IRRI is also sharing rice breeding lines with Burundi that are being tested at a number of IRRI field sites around the country.

Source: IRRI Newsletter, 6th November 2013

Ethiopia: First Largest Astronomical Observatory in East Africa

Ethiopia has inaugurated its first astronomical observatory, the largest in East Africa, for the exploration and space research. Equipped with two telescopes, each being a meter in diameter, to perceive extra planets, different types of stars, the Milky Way and deeper galaxies, the observatory will be run by the Ethiopian Science and Space (ESSS)

Company. The observatory, located at 3,200 meters above sea level in the lush Entoto Mountains near the capital, Addis Ababa, an ideal location because of its minimal cloud cover, moderate winds and low humidity, and costing \$3.4 million was financed by an Ethiopian-Saudi businessman. Established in 2004 in Ethiopia, which is no doubt one of the fastest growing countries in Africa, even if it has still to confront widespread poverty and imbalances, the Ethiopian Society of Sciences was first greeted with suspicion, earning the dubious nickname of 'Club of Fools' at the international level. Today, nine years later, Addis Ababa seems to have won the bet and aims to launch its first satellite into orbit within three years. The Ethiopian government is also set to launch a space policy in the coming years. The ESSS is now looking to open a second observatory 4,200 meters above sea level in the mountains of Lalibela in Northern Ethiopia. According to ESSS, Ethiopia will also launch its first satellite in the next three years to study meteorology and boost telecommunications. Meanwhile, if Ethiopia has decided to go after 'the conquest of the stars', as some media have described it, there are peers in Africa that have also decided to invest in astronomical research: South Africa has had its own Space Agency (SANSA) since 2010; Nigeria has had NASRDA since 1999; Algeria launched ASAL in 2012 (Asal); and Egypt (EASA). Ghana should be added within a few years.

Source: Eurasia Review, 22nd October 2013

India: First Indian Inter-Planetary Mission to Mars

The first phase of India's Mars mission was declared a grand success when the Mars orbiter spacecraft was put in a parking orbit around the Earth on 5th November 2013. The Mars orbiter spacecraft, Mangalyaan (Hindi for 'Craft to Mars'), blasted off on board a larger version of the Polar Satellite Launch Vehicle (PSLV) from the Sriharikota Space Port in the south-eastern coast of India. The spacecraft separated from the launch vehicle 45 minutes after lift-off injecting Mangalyaan into the precise 241 km X 23560 km orbit around the earth. A series of six orbit-raising manoeuvres were performed to raise the spacecraft's apogee (farthest point from Earth) and build up the velocity needed by the spacecraft to escape from Earth's gravity. On 1st December, the spacecraft went out of the Earth's pull and began the journey into deep space using own propulsion to keep its date with Mars. If all operations go as planned, the spacecraft will arrive near Mars on 24th September 2014, one month before the closest approach of the comet that was discovered by Australian astronomer Rob McNaught in January 2013. According to the Indian Space Research Organisation (ISRO), September 2014 is the crucial time demanding careful operations to bring the spacecraft into the Martian orbit. Mangalyaan is planned to enter into a 372 km by 80,000 km elliptical orbit around Mars from where it will be observing the planet for six months. Mangalyaan carries science instruments, totalling a mass of 15 kg. Unlike in the case of Chandrayaan-1 spacecraft to the Moon in 2008, which carried instruments from other nations, Mangalyaan's five scientific instruments are all made by ISRO. Among these, the Lyman Alpha Photometer is aimed at studying the ratio of hydrogen isotopes to get information on escape processes of the Mars upper atmosphere. Another instrument, Martian Exospheric Composition Explorer would study the elemental composition of the atmosphere. An imaging spectrometer will study the mineralogy of Martian surface. A colour camera would take images of the red planet and if lucky, pictures of Phobos and Deimos, two satellites of Mars. A key instrument is Methane Sensor that would look for Methane whose presence is believed to be a sign of Martian life. NASA's Curiosity rover did not find methane on Martian rocks and ISRO is hoping to stumble upon it in the Martian atmosphere. The US National Aeronautics and Space Administration provides deep space navigation and tracking support services to the operations. The Mangalyaan mission is said to have cost India ~US\$ 80 million. If successful, it will make India the first Asian country to reach the red planet, propelling it ahead of China and Japan which have attempted to reach Mars, but were unsuccessful. So far, only Europe, Russia and the U.S. have successfully sent a spacecraft to Mars.

Source: Nature India, 5th November 2013

Indonesia: Insurance Solution Support to SMEs

PT Bank Danamon Indonesia, Tbk (Danamon) and PT Asuransi Jiwa Manulife Indonesia (Manulife Indonesia) have launched a partnership that provides insurance solutions to small and medium enterprises (SME). These insurance solutions are part of the Solusi Usahaku programme which is an integrated solutions programme specifically designed by Danamon to support the growth of SMEs in Indonesia. Through the Solusi Usahaku program, SME owners gain access to savings, loan, banking services and insurance products all in one place. The contribution of SMEs to the Indonesian economy is significant. At

(Contd. on Page 9)



(Contd. from Page 8 - S&T News)

present there are 55 million SMEs in the country which provide employment opportunities of up to 15 million workers annually. Danamon supports the growth of SMEs by providing comprehensive financial products and services for SME owners. This programme is in line with Danamon's vision to care and enable millions of people achieve prosperity. Out of around 55 million small and medium enterprises, only 20 million have bank accounts. In response to the low rate of banking services penetration in this segment, Solusi Usahaku has been launched as it embodies Danamon's brand promise. SME owners need insurance solutions to protect not only themselves and their families, but their employees as well. These comprehensive insurance products are launched specifically designed for SME owners to support their growing business and personal needs and providing solutions that protect what matter most to them - family, health, investments, and their growing enterprises. Manulife Indonesia and Danamon are both committed to its cause for supporting the growth of the Indonesian SME sector by providing awareness on the importance of insurance for both personal use and for businesses.

Source: WASME World SME Update, 1st-15th November 2013

Jamaica: Local Sorrel Harvesting Machine

Prototype of a new sorrel harvesting machine, which could significantly boost local production, was unveiled at the offices of the Rural Agricultural Development Authority (RADA), Ministry of Agriculture and Fisheries in St. Andrew on 12th November 2013 [<http://jis.gov.jm/local-sorrel-harvesting-machine-unveiled/>]. Sorrel - spinach dock or narrow-leaved dock - is a type of garden herb or leaf vegetable with a flavour that is similar to kiwi fruit or sour wild strawberries and is used in soups, sauces and salads. There are a lot of constraints in terms of the cost of production, especially labour, which is required to harvest sorrel. If one is to look at the production of sorrel in commercial quantities and to increase the volume, not only for local consumption, but for export, there is no way one can handle the harvesting by manual labour. However, it is very important for RADA that sorrel production consistently increases, because it is a tremendous crop. Therefore the new machine is designed to, among other things, increase the volume of sorrel harvested, while reducing the time and manpower needed to do so. It is therefore a welcome innovation, capable of revolutionizing and enhancing the sorrel sub-sector, and is one step further up the value chain; one step in making our agriculture more efficient; and one step in getting more farmers involved and getting more for their dollar, by using technology to drive the sector.

Source: CARDI Agri. in the News, 10th-16th November 2013

Kenya: African Plant Breeding Academy

Researchers from the University of California, Davis and their global partners from the African Orphan Crops Consortium have opened the African Plant Breeding Academy in Kenya to focus on traditional crops that have been neglected for having lower economic priority. The academy located at the World Agroforestry Centre in Gigiri plans to sequence, assemble and annotate the genomes of 100 traditional African food crops to guide development of vegetables, fruits and other agricultural products that are more robust and nutritious. The project is intended to help eliminate hunger and malnutrition, which frequently causes physical stunting and incomplete neurological development among children in rural Africa, and is designed to improve the livelihood and health of Africa's 600 million smallholder farmers and their families. The consortium includes the African Union - New Partnership for Africa's Development (AU-NEPAD Agency); Mars, Incorporated; World Agroforestry Centre (ICRAF); Beijing Genomics Institute (BGI); Life Technologies; World Wildlife Fund; UC Davis; and iPlant Collaborative and Biosciences eastern and central Africa - International Livestock Research Institute (BeCA - ILRI). Over five years, the academy will train 250 plant breeders and technicians in genomics and market-assisted selection. The work will drive production of improved crops, which will then be shared with smallholder farmers throughout the continent. It will also provide scientists and technicians with a dedicated place to apply genomic tools to facilitate development of food crops that have higher nutritional value and can better withstand climate changes, pests and disease. Among the crops under review at the academy include the baobab tree, which can be used to make a dried fruit powder for consumer products and has 10 times the antioxidant level of oranges and four times more potassium than a banana. It also has antiviral properties and is gluten free. By sharing knowledge of the genome sequences of baobab and other African crops, scientists and technicians working at the academy will inform plant breeders and farmers of species varieties that are more nutritious, hardier and more productive. The data derived from this collaborative effort will be made

publicly available, with the endorsement of the African Union, through a process managed by the Public Intellectual Property Resource for Agriculture.

Source: Crop Biotech Update, 4th December 2013

Mexico: Observatory pushing the Limits of γ -Ray Astronomy

The High-Altitude Water Cherenkov Observatory (HAWC) at Orizaba, North America's third-highest peak at ~4,000 mtrs above sea level in Puebla State about a 3-hour drive southeast of Mexico City, will be fully operational in autumn 2014 to hunt for highest-energy sources known in the Universe, but more than one-third of the tanks are already taking data, mapping higher-energy cosmic and γ -rays than similar observatories could detect before. HAWC will finally have a tight array of 300 barn-sized tanks in 20,000 sq.m. area filled with 180,000 L of water in a corrugated steel cylinder, lined with a water-tight bladder that also keeps the inside dark. At the tank's bottom, 4 sensors count each photon of Cherenkov radiation. By noting Cherenkov light pattern, the energy and direction of provenance of the original γ -ray can be calculated. The array is expected to detect about 20,000 cosmic rays and a few γ -rays every second in the range of 0.1–100 TeV. HAWC will thus spot events that are too brief to be caught by swivelling telescopes or, when with enough time, it will enable other instruments to zero in on the source and image it with their sharper view.

Source: Nature, 22nd November 2013

Nepal: GIS Mapping in Elections

For the first time in Nepal, the Election Commission (EC) has done Geographical Information System (GIS) mapping of all the polling stations for a free and fair voting in the Constituent Assembly election. With the adaptation of this hi-tech system, the election body has recorded information about the road accessibility, state of infrastructure, means of communications, possibility of helicopter landing and the geographical details in around the polling stations. Now the EC has GIS images of 10,017 polling stations across the country. The EC obtained satellite maps from Google Earth and managed to record all the details concerning the polling stations in the new system by mobilising its staff. The GIS mapping is a strategic plan and it will be used while supplying sensitive electoral materials and deploying security personnel during the election. Helicopters for emergency operation and rescue will also follow the GIS set points during the election. Officials assigned to handle the GIS can also check whether voters have basic facilities like drinking water, weather and road accessibility.

Source: Coordinates, 20th October 2013

Qatar: Saltwater-cooled Greenhouse grows Crops in the Sahara

How do you grow vegetables in arid areas? Reverse the trend of desertification, the Sahara Forest Project supported by fertiliser companies proposes. The project combines existing technologies, such as the evaporation of saltwater to create fresh water along with solar thermal energy technology to utilise what we have (saltwater, CO₂) to produce what we need (food, fresh water and energy). The Qatar pilot plant of the project produced 75 kilograms of crops (like cucumbers) per square meter annually while consuming only sunlight and seawater that is comparable to commercial farms in Europe. At the centre of the project is a saltwater-cooled greenhouse. At one end, salt water is trickled over a grid-like curtain so that the prevailing wind blows the resulting cool, moist air over the plants inside. This cooling effect allowed the Qatar facility to grow three crops per year, even in the scorching summer. At the other end of the greenhouse is a network of pipes with cold seawater running through them. Some of the moisture in the air condenses on the pipes and is collected, providing a source of fresh water. One surprising side effect is how the cool, moist air that was leaking out encouraged plants to grow spontaneously outside. By reducing exterior air temperatures with 'evaporator hedges' the plant was able to grow crops like barley and salad rocket (arugula) along with useful desert plants around the seawater greenhouse. Another key element of the facility is the concentrated solar power plant, which uses mirrors in the shape of a parabolic trough to heat a fluid flowing through a pipe at its focus. The heated fluid then boils water, and the steam drives a turbine to generate power. Hence the plant has electricity to run its control systems and pumps and can use any excess to desalinate water for irrigating the plants. The project has also experimented with culturing heat-tolerant algae, growing salt-tolerant grasses for fodder or biofuel, and evaporating the concentrated saline the plant emits to produce salt. The Qatar plant is 1 hectare with 600 square meters of growing area inside. a 20-hectare test facility near Aqaba, Jordan is next up.

Source: SmartPlanet, 11th November 2013



Research Training Fellowship for Developing Country Scientists (RTF-DCS) 2012-13

Research Project Completion Reports

Bangladesh - Project Completion Report of Prof. Sukalyan Kumar Kundu



Prof. Sukalyan Kumar Kundu, Department of Pharmacy, Jahangirnagar University, Dhaka, Bangladesh was deputed by the NAM S&T Centre to Jadavpur University, Kolkata as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 29th April to 24th October 2013 to carry out research work on a project titled 'Nutritional and Antioxidant Profiling of Some Traditionally Used Rare Edible Medicinal Plants available in Rural Bengal' under the supervision of Dr Subhash C. Mandal, Associate Professor, Division of Pharmacognosy, Department of Pharmaceutical Technology.

The research work of Prof. Kundu involved observing of some reduced antioxidant or antidiabetic properties of the fruits of *Momordica charantia* that are cultivated in polluted area of Bangladesh. Through this research, it was found that there were no such significant differences in these properties of the *M. charantia* fruits cultivated in polluted area and non polluted area of Bangladesh. So it was predicted that the plant *M. charantia* adapted with the environmental pollution and regulated its biological system as per its need to survive. It was also observed that there were similarities in qualitative and quantitative phytochemical screening of all the samples. Further research is needed to isolate potent phytochemicals and thereby to detect their different pharmacological/toxicological properties for establishing a better comparative study.

Botswana - Project Completion Report of Mr. Goitseone Malambane



Mr. Goitseone Malambane, Technician at the Department of Crop Science and Production, Botswana College of Agriculture, Botswana was deputed by the NAM S&T Centre to the National Bureau of Plant Genetic Resources (NBPGR), New Delhi, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 30th April - 14th September 2013 to carry out research work on a project titled 'Transcriptional Analysis of Drought Stress Induced Genes of a Tolerant Genotype of the Maru Moth, a Moth Bean (*Vigna aconitifolia*) Drought Tolerant Variety'. He conducted his study under the supervision of Dr. K.V. Bhat of NBPGR.

The study of Mr. Malambane involved Maru moth (a moth bean variety), one of the very drought tolerant crops which can survive with minimum to no irrigation at all and produce average yield and can survive up to 40-50 days in open fields without water with temperatures up to 40°C. This crop was planted under rainout (drought) and rainy (control) environments. The work was done to understand the responses of plants to the major environmental stressors like drought which are an important topic for the biotechnological application of functional mechanisms of stress adaptation. His experiment was conducted in a split plot design with three replications for each accession and two treatments being rain-fed and drought condition. He carried out his experiment during the rainy/monsoon season between the months of June - October 2013 and maintained the drought condition by pulling a permanent overhead cover to keep the rain out. Data collection was done on the main plants traits that are highly associated with moisture stress. He collected plant samples from both environments and these samples were taken to the lab for RNA extraction and transcriptome analysis. It was observed that the morphological data showed highly significant figures for all the traits collected. The roots under drought conditions grew deeper into the soil in trying to reach out to the water table so as to access water to meet the requirement needed for plant growth and assimilation of nutrients. The Gene expression analysis of 16090 (control) and 15096 (drought) transcripts were carried out by mapping all high quality reads on assembled transcripts and FPKM (Fragments per Kilobase of exon per Million fragments mapped) values were calculated. The highly expressed Transcription Factor (TF) in both samples was the MYB which recorded more than half and just less than half transcript counts for control and drought stressed respectively. MYB is a TF often related to increasing stress-protective proteins and efficient stomatal closure under water-deficient conditions. The second largest expressed TF were the bZIP TFs which were highly expressed in the drought stress samples (16%) than in the control sample (15%). The bZIP family is involved in many regulatory and developmental processes, including ABA and stress signaling, seed maturation and flower development, playing also an important role in abiotic stress responses.

It was concluded that it is important to study the TFs of most drought tolerant crops, so that they can better be understood and be documented for future breeding of the crop and other crops also. This study also provided the understanding of Transcriptional analysis of drought tolerant crops which should continuously be explored so that more knowledge of the genes that are responsible and highly active during the drought stress in plants can be learnt and documented so that these can be used in further studies and also in plant breeding for highly tolerant crops.



(Contd. from Page 10 - RTF-DCS-2012-13)

Cameroon - Project Completion Report of Mr. Jean Pierre Longue Ekon



Mr. Jean Pierre Longue Ekon, Faculty of Sciences, University of Douala, Cameroon was deputed by the NAM S&T Centre to the Institute of Himalayan Bio-resources Technology (IHBT), Palampur, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 26th March to 20th September 2013 to carry out research work on a project titled 'Phytochemical Screening and Evaluation for Cytotoxic Activity of Some Cameroonian Medicinal Plants such as *Selaginella myosurus* (Selaginellaceae) and *Palisota preussiana* (Commelinaceae)' under the supervision of Dr Bikram Singh Chief Scientist and Head, NPP Division, IHBT.

During his research period, Mr. Ekon isolated six molecules from the ethyl acetate fraction of roots and twigs of *Selaginella myosurus* (Selaginellaceae). The basic skeleton of four molecules is characterised as flavones (smef2, smef9, smef10, smef11) by their 1D- and 2D-NMR, MS, UV and IR analysis along with two triterpene skeleton types (smef1, smef3). The suggested structures of these flavonoids are amentoflavone, robustaflavone, 2,3-dihydroamentoflavone, 2, 3, 2⁹,3⁹- tetrahydroamentoflavone. The complete characterisation is under progress to determine the site of linkage in those structures. These suggested compounds have been reported to exhibit good cytotoxicity potential on many cancer cell lines. The present research offers further proof that biflavonoids are the main compounds of the genus *Selaginella* and this finding may provide a hint for the search of new and bioactive biflavonoids from this plant. Mr. Ekon was also expected to explore the others fractions (n-butanol and water fractions) of this plant and submit the isolates to cytotoxic activity.

Eight compounds have been isolated from different fractions of the whole plant of *Palisota preussiana* (Commelinaceae). Compounds pp-1, pp-6 and pp-9 were identified unambiguously as 20-hydroecdysone, stigmaterol and sitoindoside I respectively on the basis of their MS and ¹H NMR, ¹³C NMR spectra and by comparison of their spectral data with reported data. Compound pp-2 appears to be a polysaccharide of glucose. Analyses are still ongoing to determine the number of sugar units of this compound. Compound pp-9, a widespread ecdysteroid in plants, was previously found in other species (*Cyanotis arachinoidea*, *Palisota hirsuta*, and *Commelina benghalensis* Wall. of the family Commelinaceae. In addition, Sitoindoside I and polysaccharide pp-2 have not so far been reported to occur in this genus of the Family Commelinaceae, and could serve as the chemical marker to distinguish *Palisota* from other genus. Sitoindoside I is only reported in these plants *Musa paradisiacal*, *Gnetum pendulum*, *Cremanthodium ellisii*, *Marantaceae*. Characterisation of the other molecules by different spectroscopic techniques is going on. This work is the first contribution in terms of the chemical composition of *P.preusiana*. The cytotoxicity evaluation of crude extracts and fraction of these two plants shows good potential.

Indonesia - Project Completion Report of Miss Theresia Desy Askitosari



Miss Theresia Desy Askitosari, Lecturer, University of Surabaya, Indonesia was deputed by the NAM S&T Centre to the Indian Institute of Science Education and Research (IISER), Kolkata, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 25th March to 18th September 2013 to carry out research work on a project titled 'Molecular Detection of Bacterial Symbionts associated with Entomopathogenic Nematodes (EPN) from the Agricultural Soils of Indonesia - Implications in Pest Management' under the supervision of Dr. Punyasloke Bhadury.

The study of Ms. Askitosari was aimed to detect bacteria associated with entomopathogenic nematodes (EPN) in soil samples from Trawas (Mojokerto), Indonesia based on PCR of 16S rRNA marker. EPNs collected from 27 sites representing 13 villages in Trawas, Mojokerto were subjected to PCR amplification using Eubacterial 16S rRNA primers and subsequently clone library and sequencing analyses. Amplification of bacterial 16S rRNA fragments from EPN was found to be site specific. In case of site 6, eleven 16S rRNA sequences were identified from EPN samples. Based on blastn and phylogenetic analyses, it was confirmed that many of the sequences showed close phylogenetic affiliation with bacterial 16S rRNA sequences of cultured genera such as *Alcaligenes faecalis*, *Streptococcus sanguinis*, *Escherichia coli* and *Clostridium* sp. Several 16S rRNA sequences amplified from EPN formed separate sub-clade within the phylogenetic tree indicating that these sequences were novel and they might represent indigenous bacteria that are found in Indonesian agricultural lands. Also, some of the bacterial 16S rRNA-like signatures obtained in EPNs from Trawas (Indonesia) showed close phylogenetic affiliations with opportunistic pathogens that usually infect humans. Thus, mass production and application of EPNs in agricultural soils of Trawas, Indonesia as biological control agent should take into consideration safety of farmers as well as investigate the possibility of co-contaminating crops growing in these environments. Based on this study it was concluded that EPN from Indonesian environments harbor specific group of bacteria and there is a possible symbiosis between EPN and bacterium in their microenvironments which warrants further investigation.



(Contd. from Page 11 - RTF-DCS-2012-13)

Indonesia - Project Completion Report of Mr. Mochammad Syaiful Anwar



Mr. Mochammad Syaiful Anwar, Researcher at the Research Center for Metallurgy, Indonesian Institute of Sciences (LIPI), Indonesia was deputed by the NAM S&T Centre to the Central Electrochemical Research Institute (CECRI), Chennai, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 3rd June to 25th September 2013 to carry out research work on a project titled 'Lightweight Conductive Cement Mortar Anode for Cathodic Protection of Steel in Concrete Structures' under the supervision of Dr. Vadalaksmi.

During his research, Mr. Anwar observed that in designing cathodic protection of reinforced concrete structures using impress current anode system to reduce the self-weight of anode, development of light-weight conductive cementitious mortar anode is very much needed for effective current distribution. In this study, addition of pumice aggregate (PA) as partial replacement to natural sand in the conductive cement mortar anode was evaluated. The content of pumice aggregate varied from 10-50% by weight whereas PAN based carbon fibre content varied from 0-1.1 % by volume. Conductivity measurement, dry density, compressive strength and accelerated anodic polarization test were carried out on this light-weight cementitious mortar. The results showed that the cementitious mortar in the presence of 1.1% carbon fibre content at 20-30 % replacement level of pumice aggregate has 2 times higher conductivity than that of mortar containing natural sand, whereas the conductivity of cement mortar without carbon fibre is almost nearly zero. The dry density of PA added cement mortar is 1875kg/m³ which are 15 % less than that natural sand added cement mortar and having 42 % higher compressive strength. Similarly under accelerated anodic polarization test at the current density of 200mA/m², 20-30 % PA added cement mortar at 1.1 % fibre content has shown the lowest stable potential value in the range of 0.4-1.9V in the synthetic pore solution and decreased to further 0.5-1.5 V in the presence of chloride. His results confirmed that cementitious mortar having 20-30 % PA with 1.1% carbon fibre content is an optimum level to have highest efficiency in the reduction of

Mauritius - Project Completion Report of Miss C.D. Gooria



Miss C.D. Gooria, Senior Technical Officer, Ministry of Agro-Industry and Food Security, Mauritius was deputed by the NAM S&T Centre to the National Bureau of Plant Genetic Resources (NBPGR), New Delhi, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013. Ms. Gooria carried out her research on 'Detection of Genetically Modified Organisms (GMO) in Maize from Mauritius: A Case Study' under the supervision of Dr. (Mrs.) G.J. Randhawa, Principal Scientist in two sessions of 20th February - 2nd April and 31st July - 19th December 2013.

The research of Ms. Gooria was focused on a study to check the GM status of planting material, feed and food products of Maize (*Zea mays* L.) in Mauritius. 33 maize samples (2 planting material, 11 feed and 20 food products) ranging from seeds to highly processed food products originating from 14 different countries (Argentina, Australia Belgium, China, France, Holland, India, Malaysia, Mauritius, Philippines, South Africa Thailand, UAE and Zambia) were taken up for the study, most of which were randomly collected from the local market in Mauritius in February and July 2013. All samples were tested in the GM Detection Laboratory at NBPGR using the Polymerase Chain Reaction (PCR) based technology. The samples were homogenised to fine powder and DNA was isolated using the modified SDS (Dellaporta *et al.*, 1983) method and a modified CTAB method as standardised in the host laboratory, with suitable purity of $A_{260}/A_{280}=1.8\pm 0.2$ and sufficient yield. PCR amplifiability of the isolated DNA samples was confirmed using amplification for maize specific endogenous reference gene *Adh1*. Matrix approach was identified as the most efficient and cost-effective strategy for screening of GMOs (Waiblinger *et al.*, 2010, Holst-Jensen *et al.*, 2012, Randhawa *et al.*, 2014). In this study, the matrix for most of the GM maize events was developed to select the screening assays. Initial screening of test samples was carried out for commonly employed control elements, *CaMV*p35s, *tNos* and *CaMV* t35s. Based on the preliminary screening, 15 out of 33, i.e. 45% (9 feed and 6 food products), imported from Argentina, South Africa and Holland were GM positive. As expected, no GMO was identified from countries namely India, Thailand, UAE and Zambia with no GM approval and in planting material. GMO was also not found in the highly processed food samples from Malaysia and Philippines although GM is approved in these countries.

Three of the test samples were already labelled for GM (a cornflakes, a tortilla chips) and non-GM (a canned corn) and the GM status of these samples was confirmed, as expected. The remaining 13 samples had no GM labelling. To further confirm the GM status, PCR assays for *EPSPS* and *cry1Ab* transgenes were also done. Eight samples were positive for *EPSPS* and 2 samples for *cry1Ab*. Event specific detection of selective samples (which were found to be GM in screening) was carried out for 7 commercialised GM maize events (NK603, TC1507, *Bt11*, *Bt176*, MON810 and GA21), with event specific primers. NK603 event was detected in 8 samples; TC1507 in 8 samples; MON88017 in 4 samples and *Bt11* in 2 samples. Two samples were detected with three events NK603, TC1507 and MON88017; one sample detected with two events NK603 and TC1507 and two samples detected with two events NK603 and MON88017. Four samples found positive for TC1507, also showed amplification for *tNos* element. Similarly, two samples found positive for *Bt11*, also detected amplicon of t35s sequence. The results indicated that these samples might also have other events, which were not tested for in the present study, this might be due to mixing of lots or presence of stacked events.

The study of Ms. Gooria gives an indication for the presence of different GM maize events in the food, feed and supply chain. The samples which were GM positive, were imported from GM and non-GM growing countries. Since detection for GMO is not currently carried out in Mauritius, there is scope for development of GM diagnostics to test GM status of imported products.



(Contd. from Page 12 - RTF-DCS-2012-13)

Myanmar - Project Completion Report of Ms. Htet Ne Oo



Ms. Htet Ne Oo, Assistant Lecturer, Department of Technical and Vocational Education, Ministry of Science and Technology, Myanmar was deputed by the NAM S&T Centre to the Central Scientific Instruments Organisation (CSIR-CSIO), Chandigarh, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 24th March to 19th September 2013 to carry out research work on a project titled 'Development of Geographical Information System (GIS) for Mandalay Region' under the supervision of Dr. S. K. Mittal, Chief Scientist and Mr. Satish Kumar, Principal Scientist.

During her research, Ms. Htet Ne Oo attempted to find out the solution for disaster relief with the use of GIS. She observed that Geographical Information System (GIS) is a computerized system that captures, stores, manages, analyzes and represents data according to geographical location references and can be utilised in different aspects of application areas such as environmental assessments, land information system, education and research area, health care, forestry and wild life tracking, ground water resources management, business and retails and Emergency Management and Disaster Relief. In her research work, development of GIS for Mandalay Region is described. This system can be used for post earthquake disaster management. When the earthquakes happen, people can know the most proper way to reach safe and secure area. Moreover, the aid and support teams can contact the earthquake victims as soon as possible by using this system. The system is implemented by using Arc-GIS tool. Data input to the system are base maps from the geological survey sites and other ancillary data such as population for Mandalay Region, data about schools and hospitals for rescue area and earthquake historical data that were gained from government offices, USGS and other survey sites. After creating geodatabases these data will be analysed to know which path is most suitable for victims to reach safe areas. Moreover, which area of Mandalay Region is most prone to damage by earthquakes can be known by using building statistics. Losses of human life and personal possessions due to earthquakes can be effectively reduced by using this system.

Rwanda - Project Completion Report of Mr. Marc Ndimukaga



Mr. Marc Ndimukaga, Senior Research Officer and Consultant at Association pour la Promotion des Etudes d'Impact Environnementaux au Rwanda (APEIER) was deputed by the NAM S&T Centre to the Agharkar Research Institute, Pune, India under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 29th March to 21st September 2013 to carry out research on a project titled 'Honey Bee Pollination and Coffee Production' under the supervision of Dr. D.G. Naik, Scientist 'F'.

The studies of Mr. Marc Ndimukaga were focused on the development of pheromone based lures for attracting honeybees *Apis florea* for pollination purposes. These lures were prepared by purifying commercially available Citral, which is a mixture of two isomers of Citral. The isolated lure (geranial) was applied as honeybees' attractants to coffee plantation and the results proved to increase the coffee pollination efficiency. Besides developing honeybees' lures, a study on Rwandan propolis was conducted with the aim of obtaining its extracts. Propolis extracts have many uses in traditional medicine where they are used in wounds healing, treatment of dermatological diseases and treatment of respiratory track infections as well as serving as a local anesthetic. The fractions, thus obtained, as well as the volatile oils were submitted for evaluation of their anti-oxidant, anti-bacterial and anti-inflammatory activity.

Results from this research encourages the application of pheromone based lures to be applied on African honey bees as attractants to increase coffee pollination efficiency as well as other crops requiring honeybee pollination. Results on propolis application would be applied for medicinal purposes but also as a honey bee repellent that would lead to the reduction of honey bee poisoning once the repellent is applied with pesticides to crops.

Senegal - Project Completion Report of Mr. Ly Mamadou Ousseynou



Mr. Ly Mamadou Ousseynou, Trainee at the Centre National de Recherches Forestières (CNR/ISRA), Senegal was deputed by the NAM S&T Centre to the Forest Research Institute, Dehradun, Uttarakhand, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 4th March to 9th September 2013 to carry out research work on a project titled 'Evaluation of *Jatropha curcas* L. on Salt Stress' under the supervision of Dr. Dinesh Kumar.

During his research, Mr. Ousseynou observed that soil salinity is the major factor of land degradation particularly in arid and semi-arid zones. These zones are subsequent to drought and form about 2/3rd part of earth's area. Soil salinity causes decrease in osmotic potential of the soil solution, nutritional imbalance or toxicity of ions and it is also one of the major factor affecting germination and plant. Its effects on plants vary depending on whether one is interested in the phase of germination or to development. *Jatropha curcas* L. (Euphorbiaceae) is a species widespread in tropical and subtropical regions around the world. *J. curcas* is able to grow on poor and marginal soil not used for food production. It is a multipurpose species, producing oil from its seeds. Many companies



(Contd. from Page 13 - RTF-DCS-2012-13)

are optimistic about the potential of *Jatropha curcas* L. as a potential substitute of fuel. The study of Mr. Ousseynou characterized the seeds of two provenances of *Jatropha curcas* (Niore and Kaffrines). He focused on the length, width, thickness, weight of seeds, coat and Kernel. Without the thickness, the results showed that the provenance of Kaffrine seed size and weight were more important than the provenance Niore. This study also investigated the effect of different concentrations of NaCl (0, 2, 4, 8, 16 and 35, in g/l) on seedlings of two sources (Niore and Kaffrine) of *Jatropha curcas* L in glasshouse conditions. The tolerance of the two provenances has been studied by their ability to grow and production. Indeed, stem height, root collar diameter, shoot and root dry biomass at the end of the experiment depend on the level of salt stress. Both provenances showed salinity tolerance by the important reduction of Shoot and root elongation and biomass. The provenance Niore growth more important than the provenance Kaffrine. However, the provenance Kaffrine produces more air dry biomass. Finally, the work studied the effect of salinity (NaCl : 0, 2, 4, 8, 16 and 35 g/l) on the germination of *Jatropha curcas* L. (provenance Niore). The experiment was installed in a germinator at 30 °C. A batch of 20 seeds were soaked for 24 hours in these different salt concentrations and sown in 14 cm Petri plate on filter paper beds Whitman No. 1. The water uptake was calculated and seed germination recorded every three days up to 18 days. The results showed that salt stress affects the water uptake, the germination percentage and mean daily germination of *Jatropha curcas*. These parameters were significantly affected from 8g/l. The results also showed that germination was inhibited by 35g/l. There were significant negative linear correlation between NaCl concentrations and water uptake, germination percentage and mean daily germination.

Sri Lanka - Project Completion Report of Mr. M.R.M. Farees



Mr. M.R.M. Farees, Regional Mining Engineer, Geological Survey and Mines Bureau, Sri Lanka was deputed by the NAM S&T Centre to the CSIR-National Institute of Oceanography (NIO), Goa, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 29th March to 21st September 2013 to carry out research work on a project titled 'Application of Safe Mining Method for Extracting Beach Mineral Sands along Eastern Coastal Belt in Sri Lanka' under the supervision of Dr. Anup R Gujar and Dr. Rahul K Sharma, Chief Scientists.

During his period of stay in NIO, Mr. Farees visited Central Institute of Mining and Fuel Research [CIMFR] and Central Mechanical Engineering Research Institute [CMERI] to understand the latest exploration and exploitation techniques. He studied the sedimentological and mineralogical aspect by collecting the samples from 04 type localities from eastern coast of Sri Lanka (Pulmodai, Thirukovil, Thampattai, Vaharai) and analysed these samples. The results indicate that the sediment from above areas are tri or polymodal and moderately well sorted fine sand, and these sands are indicative of their deposition under beach environment. The heavy mineral contain is more than 82% and it was maximum up to 96% and the heavy mineral suit is composed of limonite, ilmenorutile, magnetite, zircon, etc, in variable proportions. Mr. Farees also attended the demonstrations held in CIMFR and CMERI regarding the operation of Ground Penetrating Radar [GPR] system and water jet mining system. It was felt that more training is required in the field of application of GPR technique in the placer exploration which would add a new dimension of the placer exploration programme conducted by Geological Survey and Mines Bureau [GSMB], Sri Lanka.

In addition, Mr. Farees studied the possible environmental effects of beach placer mining as well as principles, types and components of environmental impact assessment (EIA). This was followed by research on development of environmental management plan (EMP), its scope, purpose and components. This was concluded with suggested measures for minimising the impacts, solutions for mineral crises and proposed mitigation methods for beach placer mining in eastern Sri Lanka.

Tunisia - Project Completion Report of Ms. Habibi Imen



Ms. Habibi Imen, Ph.D. Student in the Research Laboratory of Renal Transplantation, Immunology and Immunopathology, University Tunis El Manar, Tunisia was deputed by the NAM S&T Centre to the VIT University, Vellore, Tamil Nadu, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2012-2013 for a period from 16th February to 10th August 2013 to carry out research work on a project titled 'Molecular and Biochemical Consequences of Genetic Abnormalities of Factor H in Atypical Hemolytic Uremic Syndrome (HUS)' under the supervision of Prof. M.A. Vijayalakshmi.

The study of Ms. Habibi was aimed at understanding the total or the partial deficiency of the factor H protein antigen level in HUS. In order to find out the difference between the factor H in plasma of control, heterozygotes and patients proteomic analysis was carried out. For this study, the plasma of the normal, heterozygotes and factor H mutated patient were depleted from most abundant proteins - albumin and IgG, using albumin and gamma globulin depleting column. The flow through and eluent were collected and subjected to SDS-PAGE analysis. The distinct bands in that gel were cut and subjected to trypsin digestion by using gel digestion procedure. Digested peptides were subjected to LC-MS/MS analysis. Proteomic analyses of all the samples showed the presence of factor H. The results confirmed that FH truncated were able to get secreted in the patient. So the total deficiency of the FH protein in this case, can be explained by the conformational change of the structure of the protein. From these results it was concluded that further enrichment of Factor H is required in the plasma samples in order to improve MS/MS spectra. Molecular simulation and docking studies will be helpful to predict the loss of function or modification in binding site in truncated version of Factor H.



DISTINGUISHED VISITORS TO THE CENTRE



H.E. Gholamreza Ansari, Ambassador (3rd from R) and Dr. M. Hassan Shafazand, Head of Technology Cooperation (3rd from L), Embassy of Iran in India



Mr. Nick Ishmael Perkins, Director, SciDev.Net, London, UK



Prof. Alexander E. Yunovich, Physics Department, Moscow State University, Moscow, Russia and Ms. Nina Yunovich



Mr. Gilles Colson, International Affairs Manager and Ms. Alison Lenaerts, International Affairs Trainee, GreenWin, Belgium



Mr. Mark Templer, Vice Consul, US Consulate General, Karachi, Pakistan



Dr. Soraya Caro Vargas, Director, CESICAM, Externado University, Colombia



Ms. Tanuja Ariyananda, Director, Lanka Rain Water Harvesting Forum, Sri Lanka

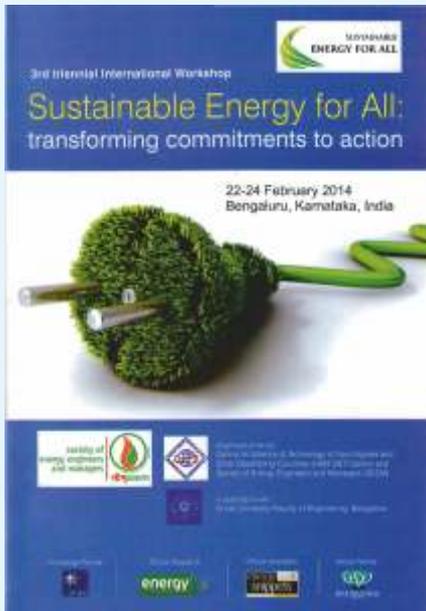
- 17th Oct 2013** **Mr. Mark Templer**, Vice Consul, US Consulate General, Karachi, Pakistan
- 17th Oct 2013** **Dr. Soraya Caro Vargas**, Director, Centre of Research & Services on India and Southern Asia (CESICAM), Externado University, Colombia
- 18th Oct 2013** **H.E. Gholamreza Ansari**, Ambassador and **Dr. M. Hassan Shafazand**, Head of Technology Cooperation, Embassy of Iran in India
- 11th Nov 2013** **Mr. Nick Ishmael Perkins**, Director, SciDev.Net, London, UK
- 25th Nov 2013** **Mr. Gilles Colson**, International Affairs Manager and **Ms. Alison Lenaerts**, International Affairs Trainee, GreenWin, Belgium
- 9th Dec 2013** **Prof. Alexander E. Yunovich**, Physics Department, Moscow State University, Moscow, Russia and **Ms. Nina Yunovich**
- 13th Dec 2013** **Mr. Mmboneni Muofhe**, President, NAM S&T Centre and Deputy Director General, International Cooperation and Resources, Department of Science & Technology (DST), South Africa

- 20th Dec 2013** **H.E. Mrs. Gennet Zewdie**, Ambassador of the Federal Democratic Republic of Ethiopia to India, New Delhi;
- Prof. Dr. Lidia Szyrkowicz**, Scientific Counselor, Embassy of Italy, New Delhi;
- Dr. Mukesh Kumar**, Head, International Health Division, Indian Council of Medical Research (ICMR), New Delhi;
- Dr. Amitava Bandopadhyay**, Head, International Science & Technology Affairs Directorate (ISTAD), Council of Scientific & Industrial Research (CSIR), New Delhi;
- Prof. P.K. Gupta**, Secretary General, National Foundation of Indian Engineers (NAFEN), and Member, Academic Council, University of Delhi;
- Mrs. Sadhana Relia**, Head, International Multilateral and Regional Cooperation Division (IMRCD) & Scientist 'G', Department of Science & Technology (DST), Govt. of India, New Delhi;
- Dr. Ruckmini Arunachalam**, Scientist - B, IMRCD, DST
- 30th Dec 2013** **Ms. Tanuja Ariyananda**, Director, Lanka Rain Water Harvesting Forum, Sri Lanka

Centre Announces

THIRD TRIENNIAL INTERNATIONAL WORKSHOP ON SUSTAINABLE ENERGY FOR ALL: TRANSFORMING COMMITMENTS TO ACTION

Bengaluru, India, 22-24 February 2014



Sustainable energy - energy that is accessible, cleaner and more efficient – powers opportunity. It grows economies; lights up homes, schools and hospitals; empowers women and local communities; and paves a path out of poverty to greater prosperity for all. In short, it is meeting the needs of the present without compromising the needs of the future. The world currently invests more than \$1 trillion per year in energy, much of it going toward the energy systems of the past instead of building the clean energy economies of the future. Investing in sustainable energy is a smart strategy for growing markets, improving competitiveness, and providing greater equity and opportunity. The promise of renewable energy can only be realized through significant investments in research and development on alternative, sustainable technologies such as solar, biomass, wind, hydropower, geothermal power, ocean energy sources, solar-derived hydrogen fuel, and the energy storage technologies necessary to operate them competitively. Indeed, the transition to sustainable energy may well be the biggest business opportunity of the 21st century. The United Nations Secretary-General Ban Ki-moon is calling on governments, businesses, and civil society to make specific commitments that help achieve 'Sustainable Energy for All' by 2030. The Secretary-General's 'Sustainable Energy for All' initiative has three complementary objectives, respectively, ensuring universal access to modern energy services; doubling the global rate of improvement in energy efficiency;

and doubling the share of renewable energy in the global energy mix.

Many countries have engaged themselves in this UN initiative and made commitments needed to build a sustainable energy future for all. Commitments are promises to take action, alone or in partnership, such as launching new projects or partnerships; scaling up or accelerating existing activities; adding partners to existing projects; or renewing commitments made recently, if activities to realize these commitments are still ongoing. In the process of transforming these commitments into tangible action elements, many countries have initiated discussions between the government and stakeholders to assess the energy situation on the ground, understand their main energy challenges and the energy strategies already in place, and then develop a modus operandi for action. The level of ambition of 'Sustainable Energy for All' provides room for all stakeholders to contribute, whether big or small in magnitude of resources or scope. Within governments, involvement must not be limited to just energy ministries. Due to the wide-ranging impact of energy services, other sectors such as economic planning, health, industry, agriculture, etc., must be actively engaged. Because of the need to scale up the level of action and investment, the participation of the business community might also be sought. Given the scope of action needed, the engagement of civil society organisations and NGOs is similarly crucial. The ultimate success of 'Sustainable Energy for All' in developing countries will be based on three pillars - Strong political commitment to act from the government; Strong support from the international community; and Strong partnerships and active involvement of businesses and civil society.

In order to deliberate on the above issues, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) jointly with the Society of Energy Engineers and Managers (SEEM), Trivandrum, India, and in association with the Christ University Faculty of Engineering, Bangalore, India announces the organisation of Third Triennial **International Workshop on 'Sustainable Energy for All: Transforming Commitments to Action'** during **22-24 February 2014** in **Bengaluru, Karnataka, India**.

The last date for submission of the Nomination Form to the NAM S&T Centre is **Wednesday, 15th January 2014**.

For further details, please visit the website of the NAM S&T Centre <http://www.namstct.org>

EDITORS: Mr. M. Bandyopadhyay ❖ ASSISTANT EDITORS: Mrs. Pinky Singh, Ms. Parul Sehgal and Ms. Subhashree Basu

COMPILATION & DESIGN: Mr. Pankaj Buttan ❖ PUBLISHED BY: Prof. Arun P. Kulshreshtha, Director, Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), Core 6A, 2nd Floor, India Habitat Centre, Lodhi Road, New Delhi-110003 (India)

Ph: +91-11-24645134, 24644974, Fax: +91-11-24644973 E-mail: namstcentre@gmail.com, namstct@bol.net.in ❖ Website: <http://www.namstct.org>

Lovely Printers, New Delhi, E-mail: lovely_printers@yahoo.com; Ph: 9811086866.