

CSIR NEWS

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Team CSIR

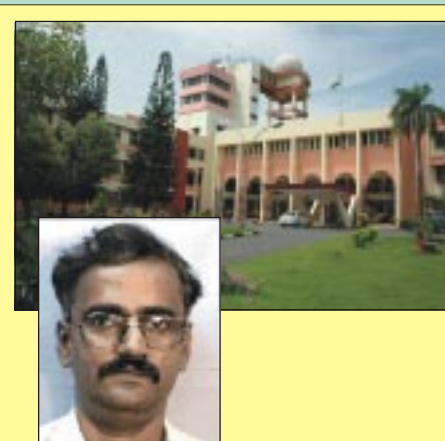


Nobel Prize for Peace to IPCC and contribution of Dr Unnikrishnan of NIO

FORMER US Vice-President Al Gore and the Rajendra K. Pachauri-led Intergovernmental Panel on Climate Change (IPCC) have been awarded this year's Nobel Peace Prize for disseminating knowledge on man-made climate change and the measures needed to confront it. The Nobel Peace Committee said that the Nobel Peace Prize is being given "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change" — i.e. something different from the earlier Peace Prizes.

IPCC has been established by World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. It is currently finalizing its Fourth Assessment Report "Climate Change 2007" (also referred to as AR4). The reports by the three Working Groups provide a comprehensive and up-to-date assessment of the current state of knowledge on climate change. IPCC has three Working Groups. The Working Group (WG)-I reports "The Physical Science Basis", WG-II reports "Impacts, Adaptation and Vulnerability", and WG-III reports "Mitigation of Climate Change".

Responding to the award to IPCC, Rajendra Pachauri very graciously said that the honour belonged to thousands of climate change scientists who developed consensus documents through the organization's rigorous and transparent scientific assessment process.



We in CSIR are especially proud for Dr A.S. Unnikrishnan, Scientist from National Institute of Oceanography (NIO), Goa, being one of the lead authors associated with the preparation of these documents which served as one of the reasons to bring the recognition to IPCC.



Dr Unnikrishnan worked (2004-2006) as a lead author of Chapter 5 on “Observations: Ocean Climate Change and Sea Level” under the Working Group I for preparation of the Fourth Assessment Report. Chapter 5 contains changes in sea level, recognizing the strong interconnections between the changes in sea level and ocean heat content. Data from tide-gauges, satellites and *in-situ* observations of temperature and salinity form the focus to assess the longterm changes in sea level and ocean heat content respectively.

Dr Unnikrishnan along with other Lead Authors jointly worked to prepare this Chapter. In particular, he worked on the assessment of changes in Extreme Sea level. Each Lead Author is assisted by several contributing authors and the Lead Author team for each Chapter is led by two Coordinating Lead Authors. The entire process of the preparation of the Report has taken over two years.

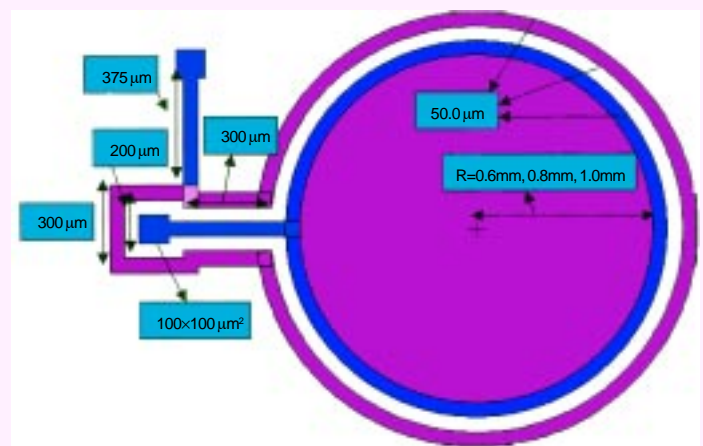
The Chapter 5 has links with Chapters 3 and 4, which deal with observations on surface atmosphere, snow and ice respectively. While observed changes in these components of the climate system are closely inter-related through physical processes, the separate chapters give a more focused assessment.

*The Chapter 5 is cited as: N.L. Bindoff, J. Willebrand, V. Artale, A. Cazenave, J. Gregory, J. S. Gulev, K. Hanawa, C. Le Querre, S. Levitus, C.K. Shum, L.D. Talley and A. **Unnikrishnan**, 2007: Observations: Oceanic Climate Change and Sea Level. *In*: Climate Change 2007: The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the Inter Governmental Panel on Climate Change [S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)] Cambridge University Press, Cambridge, United Kingdom and New York, USA.

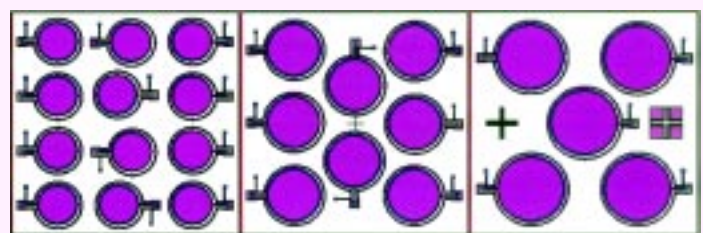
On receiving the Prize, Dr Pachauri sent a letter to all lead authors including Dr Unnikrishnan. CSIR is proud of Dr Unnikrishnan's association with IPCC and this 'shared' success.

Silicon Carbide Schottky Diodes

The Central Electronics Engineering Research Institute (CEERI), Pilani, has developed Silicon Carbide (SiC) technology for the fabrication of Schottky diodes of varying diameters from 1.2 mm to 2.0 mm in an array on a 2" diameter wafer. 4H-SiC polytype has been used with both sides polished surfaces. An epitaxial layer of 50 μm with a uniform doping of the order of $9 \times 10^{14} \text{ cm}^{-3}$ on Si-face of 4H-SiC wafer was obtained from a commercial supplier of production grade quality. The fabrication of nickel Schottky contact on Si-face of 4H-SiC has been processed using e-beam evaporation of 99.999% Ni. A 2000 \AA thick Ni was deposited, followed by vacuum annealing in Ar at 400°C for 30 minutes. Field plate and field ring termination techniques have been employed in the design of the main Schottky diode to suppress electric field crowding on the edges for improved avalanche breakdown voltage. A schematic layout of the diode equipped with field ring and field plate terminations, is shown in the following figures:



Layout of Ni/4H-SiC Schottky Diode Structure

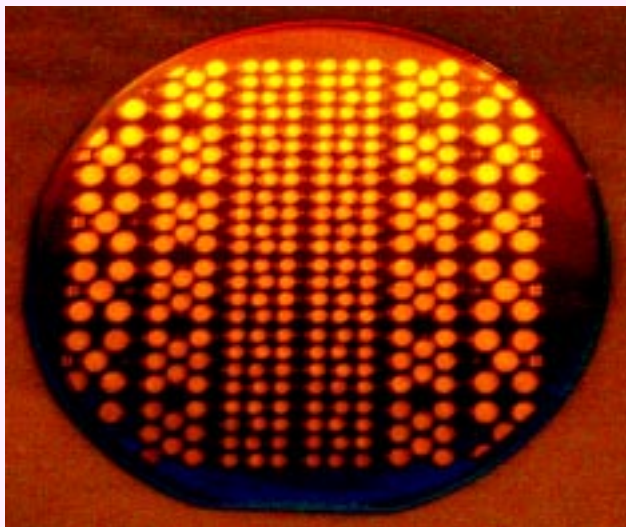


7 mm x 7 mm Chips Carrying Diodes

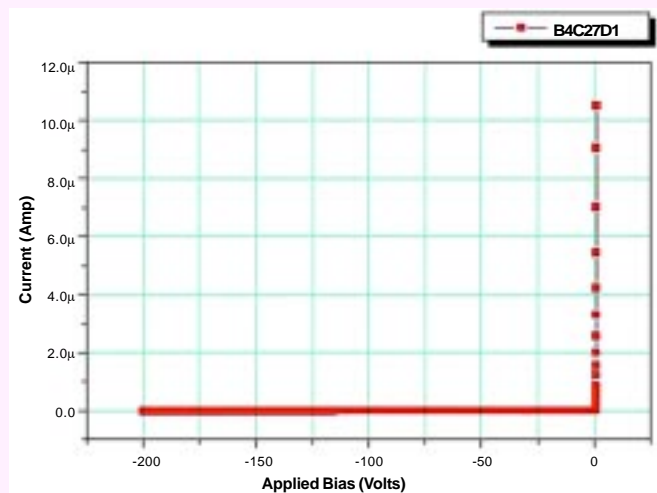
- Blue layer : Schottky metal with field plate over lay of 50 μm
- Pad contact : 100 μm
- Field ring : 50 μm

An array of similar diameter diodes was laid out on a chip area of $7 \times 7 \text{mm}^2$, so that 12 diodes of 1.2 mm diameter, 8 diodes of 1.6 mm diameter and 5 diodes of 2 mm diameter were realised on each chip. The chip was further arrayed in a matrix of 6×6 to cover the entire area of 2" diameter wafer. Pads for each diode within the chip were suitably placed to provide ease in wire bonding on TO-8 header.

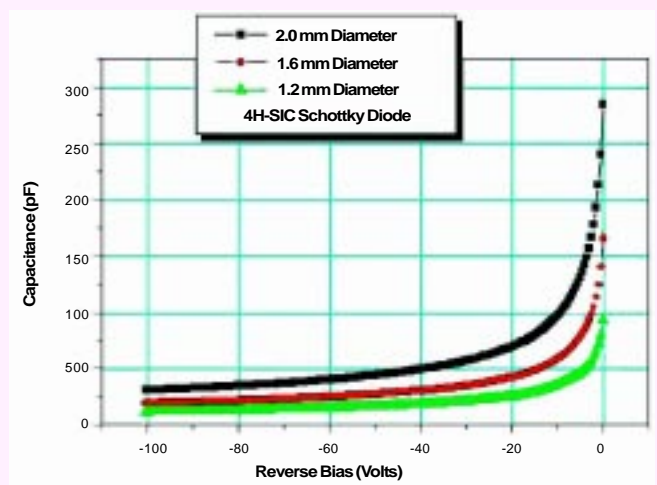
- Chip size : 7 mm
- Grid width : 100 μm
- Edge distance : > 150 μm



A Processed 4H-SiC Wafer



Measured I-V Characteristics



Measured C-V of Different Diameter Diodes

The packaged diodes were tested for their I-V and C-V performance using computer aided measurement facility. Barrier height of the Schottky contact, ideality factor of the diode and epitaxial layer doping concentration, were evaluated using measured data. The electrical performance of a typical diode is listed in the following table:

Avalanche Breakdown Voltage	Leakage Current at 200 Volts	Ideality factor	Barrier height	Doping concentration using $1/C^2$ vs Voltage
More than 700Volts	1-5 nA	1.21	1.252 eV	$1.5 \times 10^{15} \text{ cm}^{-3}$



Packaged Chip on TO-8



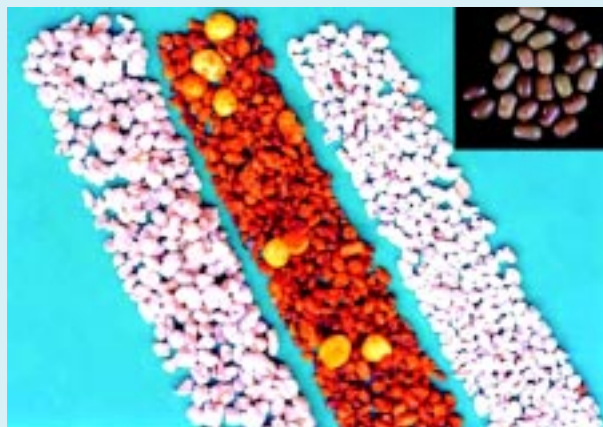
New Processes released by CFTRI

THE Central Food Technological Research Institute (CFTRI), Mysore, has released the following new processes:

Puffed Moth Bean Sweet and Savoury Snacks

The moth bean puffed snack is a ready-to-eat (RTE) product with either sweet or salt-spicy in taste. It is suitable as a low-fat snack because frying in oil or fat has been omitted to provide a good shelf life to the product without losing the attractive taste and texture of a crispy snack. The product is cost effective and has the potential to become a health food in the near future. The product can be stored for four months at ambient conditions. The small size moth bean fractions/broken could be used separately in the preparation of sweet and coated products. Whole moth bean, pregelatinized starch

powder, sugar, salt and hydrogenated fat are the materials required for the preparation of the product. Permitted food colour and flavour are essential for sweet snacks and spice powder is used for spiced snack products. Cleaning and milling, soaking, cooking, toasting, coating/flavouring, drying and packaging are the steps involved in the processing. Plant grinders, shaker/ grader, autoclave, planetary



Puffed RTE moth bean products and raw whole moth bean (inset)

mixer, dryer, toaster and pan coater are the important machineries required. The process is available for commercialization.

Continuous vada making machine

Urad vada is a popular snack food of India prepared from black gram *dhal*. The black gram *dhal* is soaked in water at ambient temperature for about 2 hours and ground to a thick viscous batter with the addition of salt for taste. The prepared batter is made into a doughnut shape and deep fat fried.

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a commercial scale automatic continuous vada making machine and the design drawing is available for commercialization. The machine can manufacture doughnut shaped

urad vada continuously, consistently and hygienically in a predetermined form, shape and size. The frying time can be regulated electronically using the controls available in the unit. The unit is simple to operate, hygienic and economically viable. The unit can also be used for other products similar to *urad vada*. The fryer unit can be used for the preparation of french fries, potato chips and other products with an attachment. As there is no mounting hassles or extended parts to the device, it can be suitably fixed wherever needed. The machine can produce approximately 700-800 vadas/hour.



Stevioside: A non - caloric sweetener

Steviol glycosides are sweet glucose bearing diterpenoids produced by the Paraguayan plant, *Stevia rebaudiana*. The plants have been traditionally consumed in South American countries, such as Argentina, Brazil, Paraguay and Mexico. Steviol glycosides vary in their composition based on the number, position and type of sugar attached to the terpenoid backbone. The two major forms are steviol glycoside, which has two glucose units, and the other one rebaudioside with three glucose rings. These compounds are about two hundred times sweeter than sucrose. Hence, they are used as sweeteners. Steviol glycoside in pure form

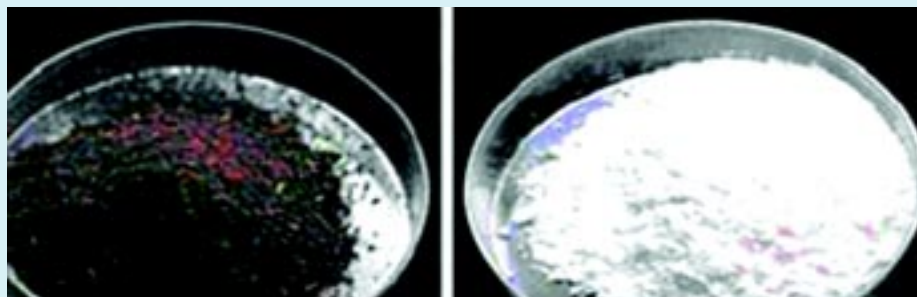
is a white, crystalline material and does not impart any color. These compounds have a lingering taste in the mouth.

Heat and pH stability widens the scope of its use in many food preparations where other conventional sweeteners cannot be used. The contribution of the steviol glycosides to our energy is minuscule, since it is not metabolized and a very small quantity such as 25 mg of steviol glycoside, is almost equal to 1 table spoon of sugar.

CFTRI has developed a process for the production of steviol glycoside extract and crystals from dry *Stevia*



Stevia rebaudiana plant



Stevioside: leaf powder and white crystalline extract

leaves. The institute has the necessary expertise to provide technical assistance and guidance to industries for commercialization. The suggested economic capacity is 1000 kg of dry leaves per day and yield is around 2%.

Preparation of radical scavenging conserve from tea leaves — normal, coarse and pruned

India is the largest producer of tea, approximately contributing to 30% of the total world production. In the tea plantations, the coarse tea leaves are not plucked for tea making and they are pruned periodically every 2-3 years. These coarse/pruned tea leaves contain substantial amount of polyphenols. Polyphenols are known for several health benefits. Fresh coarse/pruned tea leaves are dried to

inactivate the enzymes, which lead to green teas. A radical scavenging conserve enriched with polyphenols was prepared from these tea leaves using a suitable solvent. The conserve showed very good radical scavenging properties in a model system. The conserve contains mainly catechins, which have antioxidant, anticancer and antimutagenic properties. The conserve can be used as a nutraceutical in food

and confectioneries. Further, it has the potential to be used in various pharmaceutical formulations.

Main advantage of this process is the utilization of wastes from tea plantations as the raw material. Also the process could be also employed for the preparation of conserves from fresh normal tea leaves.

CFTRI has filed a patent on this process and it is available for commercial exploitation.



Virgin Coconut Oil

Virgin Coconut Oil (VCO) is extracted from fresh coconut meat without involving thermal treatment. The oil is colourless and has an intense coconut aroma. It is rich in lauric fatty acid and contains vitamin E. The virgin coconut oil has many pharmaceutical and cosmetic applications. It has a peroxidase value of less than 1 and free fatty acid (FFA) less than 0.2%. It has long shelf life due to its antioxidant properties. VCO is abundant in medium chain fatty acids such as C8, C10 and C12, and has a unique role in the diet as an important physiologically functional food. VCO has healthy saturated fats that help in maintaining proper cholesterol levels, supporting thyroid function, easing digestive disorder symptoms, averting hypoglycemia cravings and



providing many other health benefits. The virgin coconut oil has potential as a replacement for butter, margarine and other cooking oils. It is not stored in the body as fat, rather it is converted into energy. The processing steps involve deshelling of matured coconuts, paring, dewatering, disintegrating, milk extraction, enzyme treatment, centrifuging, freezing and thawing

and centrifugation. The critical steps involve centrifuging operations wherein cream is separated from fresh coconut milk and separation of oil from oil and cream mixture. The principal equipment required are hammer mill, screw press, centrifuge, bottle filling machine, fluidized bed dryer, pouch sealing machine and walk-in-cooler.

CECRI: Grant-in-aid/Sponsored Projects and Consultancy/Technical Services

The grant-in-aid/sponsored projects, consultancy and technical assignments undertaken by the Central Electrochemical Research Institute (CECRI), Karaikudi, during January-June 2007 include:

Grant-in-aid/Sponsored Projects

- Electrolytic recovery of copper and regeneration of acidic cupric chloride etchant, AT & S, Nanjangud
- Galvanic corrosion performance of magnesium alloys in automotive applications, General motor India Pvt. Ltd, Bangalore
- Evaluation of paint coated mild steel panels, Kansai Nerolac Paints Ltd, Mumbai
- Evaluation of "Exide" VRLA batteries for service life and float life with daily discharges for 12V, 1500 Ah (MST), 12V, 400Ah (EPST) and 12V, 300 AH9NEPST) batteries as per Cl No 6.13 and 6.15 of IEC 60896-21:2004, Exide Industries Ltd, Mumbai
- Electro-fabrication of seamless crucible (nickel & nickel tungsten alloy) for the salt purification cell in phyrochemical reprocessing, Indira Gandhi Centre for Atomic Research, Kalpakkam
- Development of eco-friendly chromium plating bath, DST, New Delhi
- To develop moisture compatible corrosion resistant protective coating system, Krishna Conchem Products, Mumbai
- Gold plating on reaction wheel assembly parts used in satellites, ISRO Inertial Systems Unit (IISU), Thiruvananthapuram
- Studies on the galvanic compatibility of interfacial ring components and corrosion behaviour of canister in sea

- water, DRDL, Hyderabad
- Supply of potentiostat (manual operation), Sri Narayana College for Women, Kollam, Kerala
- Supply of Digital Four Probe Resistivity meter, Coimbatore Institute of Technology, Coimbatore
- Fabric dyeing by redox mediated environment friendly process, DST, New Delhi
- Conducting polymer composites for housing electronic equipment to avoid static electricity and to control electromagnetic radiations in the range of 1GHz to 40 GHz, DST, New Delhi
- Evaluation of additives using hydrogen permeation, Panacea Worldwide Traders, Kumbakonam
- Melt/solution processable conducting polyaniline based magnetic films, DST, New Delhi
- Preparation of painting manual and study of other corrosion problems, NRL, Assam
- Evaluation of 2V/500Ah "Microtex" low maintenance batteries as per IRS S 88/04 specifications, Mysore Thermo Electric P. Ltd, Bangalore
- Feasibility study of brush electropolishing on 316 LN stainless steel with different surface conditions, IGCAR, Kalpakkam
- Corrosion monitoring of previously installed corrosion monitoring probe sensors and also on the previously monitored prestressing cables in second Thane Creek Bridge, Navi, Mumbai
- Some insight on physicochemical properties of

- different electronic-ceramics using opto-impedance probe, DST, New Delhi
- Evaluation of paint coated steel panels at low temperature, International Paint, Bangalore
- Evaluation of power build low maintenance batteries as per IRS S 88/04 specification for 2V/80Ah, 2V/200Ah & 2V/500Ah, Power Build Batteries Pvt. Ltd, Bangalore
- Evaluation of "Sharana" stationary cells as per IS 1651: 1991 specification & sulphation test (2V cells) for 2V/120Ah, Sharana Industries, Chennai

Consultancies

- To suggest corrosion protective coating for stressed post tensioning cables in second Vivekananda Bridge, Larsen & Toubro Ltd, ECC Division, Chennai
- To study the condition ECHS Conveyor steel structure of BCN 41 A/B, 42A/Band 51, TNEB, Chennai
- Vetting of design of CP system for the underground pipeline systems for SPM Project for BPCL, Kochin, Corrosion Control Services (B) Pvt Ltd, Mumbai
- Preparation of painting handbook for steel bridges in the Himalayan region, Konkan Railway Corp. Ltd, Navi Mumbai
- Recommendation of paint schemes and supervision of painting work, GHCL, Gujarat
- Corrosion measurement of product water tank at Anuvijay Township, Nuclear Power Project, NPCIL, Kudankulam
- Design of electrolytic

- defluoridator of 1000 LPH capacity, Sandur Fluid Control Pvt Ltd, Bangalore
- To suggest the area to be painted of the steel structures of boilers, Tuticorin Thermal Power Station, Tuticorin
- Installation and measurement of strain by SMER Ganges for leak test, Rajasthan Atomic Power Project-6, NPCIL

Technical Services

- To supply 10 platinized titanium anodes for R&D work, IISc, Bangalore
- Evaluation of Exide batteries for 3-h capacity followed by short circuit and internal resistance test as per EN 60896-11:2003, Exide Industries Ltd, Mumbai
- To supply electrochemical defluoridator unit, Sandur Fluid Controls P. Ltd, Bangalore
- Paint test for three panels, Anand Eng. Products Pvt. Ltd, Trichy
- Testing of organophosphonate samples, NLC Ltd, Neyveli
- Testing of paint, Altec Fabricators, Trichy
- Testing of paint samples, Jay Engineering Industries, Trichy
- Testing of paint panels, M/s Toolfab Engg. Tech., Trichy
- Testing of lead oxide samples, Exide Industries Ltd, Hosur
- Evaluation of black coatings for solar energy conversion, Mr R. T. K., Dindigul
- Analyzing the failure of Li-ion battery pack showing "0" volts, Larsen & Toubro Ltd, Mysore
- Study of filter press and cylindrical flow cell, Anna University, Chennai
- Testing of blended organo phosphonate samples, NLC Ltd, Neyveli



Joint Workshop on Ecological Forecasting: An Indo-US Initiative

The National Chemical Laboratory (NCL), Pune, organized a Joint International Workshop on Ecological Forecasting: An Indo-US Initiative during 27-29 August 2007 which mainly focused on current status of ecological forecasting, emerging needs and the causes of ecosystem change. The workshop also discussed the areas of common interest in the field of Ecological Forecasting where the two countries could collaborate. Sixty participants including five from US having varied academic and research experiences attended the workshop. Eight themes of potential collaboration were brainstormed.

Dr S. Sivaram, Director, NCL, Pune, in his inaugural address stressed the importance of various components such as reliable data, mathematical tools, computational power along with inputs from social scientists and behavioural psychologists needed for ecological forecasting. Ecological forecasting is a result of collective effort, beset with great complexity and uncertainty. Dr Sivaram said, "in a society, one needs to take correct decisions based on predictive models, however imperfect. The outcome of such an initiative is crucial to the survival of planet earth." He wondered whether any model exists which can predict the state of Planet Earth by 2050 or 2100, when the world's two populous nations will achieve a level of prosperity and consumption, which is seen today in North America, Europe or Japan.

Ecological modeling and forecasting is, thus, a very desirable goal, notwithstanding the fact that it is fraught with serious deficiencies. Giving an example of the recent debate caused by the report of the Inter-Governmental Panel on Climate Change, Dr Sivaram said that truth is always inconvenient and any prediction has an element of unpredictability. Nevertheless, weather and climate modeling still obey the laws of physics and, hence are within human reach. On the contrary ecological modeling and forecasting attempts to predict the impact of physical, chemical, biological and human induced changes on ecosystems and their components. This is indeed a formidable challenge. Human behaviour hardly obeys the laws of Physics! In fact the Malthusian model on population followed by the prediction of the Club of Rome has not necessarily infused confidence in predictive modeling of social systems. The world is in the midst of a raving controversy presently on the subject of fuels from biomass. As nations, driven by their unsustainable demand for energy, shift to bio-fuels, deep seated changes are anticipated in the global ecosystems. Does one have a predictive model, to enlighten the decision makers, on what the consequence will be if a substantial portion of human energy consumption shifts to bio-fuels, say by 2100.

The first session on Introduction and Need for Ecological Forecasting had two presentations. Dr

Townsend Peterson of the Natural History Museum and Biodiversity Research Center Kansas University, USA, through his presentation took the audience to a tour of monuments, specimens as old as 1800s, museums, old documents explaining the major amount of investments involved in recording over a period of time. Dr Peterson informed that a complete site ornis.org is coming up with a portal that would be built to create biodiversity informatics exclusively for ornithology. His talk emphasized the importance of data, the tools required for data mining and realistic quality data which would give rise to new field work in the area of ecological forecasting, data management and integration. While talking about datasets, Dr Peterson remarked that India is having a large amount of rich information which needs to be recorded in the datasets. The providers of biodiversity information on the Indian Ocean like the Indian Ocean Biogeographic Information System (IndoBIS), National Institute of Oceanography (NIO), Goa and Zoological Survey of India, Kolkata, mainly focus on the survey of faunal resources and endangered species.

Dr Peterson gave another talk on the concluding day of the workshop in which he discussed tools and protocols for ecological forecasting by sharing various websites and highlighting the details of specific tools and approaches.

Second speaker of the first session Shri Vishwas Chavan from NCL, Pune, who was also the



Clockwise (from top left): Dr S. Sivaram, Director, NCL, delivering his inaugural address; Dr S. Krishnan welcoming the participants; Dr Townsend Peterson speaking about workshop; Shri Vishwas Chavan proposing the vote of thanks

convener of the workshop, spoke on 'Ecological forecasting is a science to perform forecasting across society'. He discussed the issues of non-data availability and the need to make it available to anyone, anytime and anywhere. The data are the essential base of ecological forecasting and needs to be authentic and sufficient. It needs a prior model rather than a posterior one for computing mathematical models infrastructure and data content. Referring to the work performed at NCL, Shri Chavan

said that the database IndFauna contained 94,000 plus species while IndoBIS collections contained 40,000 plus species. Data are needed to maintain specimens of species which play a role in the ecosystem and the environment as a whole. He stressed the need to record traditional knowledge, being the heritage and making it easily accessible.

The second session on Case Studies in Ecological Forecasting had three speakers. Shailey Menon from Grands Valley State University,

USA, presented the case study of nuthatches, referring to the analysis and exploration of the ecology and distribution of Asian nuthatches, objectives of exploring the distribution of Asian nuthatch species in ecological and geographic space, relationship between niche breadth and niche volume, and exploration of the relationship between potential range filling and montane habit. The data on Eurasian nuthatches (14 nuthatch and 1 wallcreeper) and the methods used were discussed.



The second speaker Dr Kristina McNyset of US Environmental Protection Agency (US EPA), who presented a case study of ecological forecasting in aquatic ecosystems, stated that it poses a unique challenge to researchers in terms of data availability and scale-dependent limitations. Ecological data has been useful in predicting freshwater species distributions at regional to worldwide scales, even without the inclusion of *in situ* measurements of in-stream variables. However, if site sampled datasets are available, local to site specific distributional predictions can be generated. Dr McNyset presented examples of analyses at multiple scales in aquatic ecosystems using continuous and site sampled data and discussed their integration into invasive species risk assessments and impacts on biotic integrity.

In her second presentation in the sixth session Dr McNyset explained that huge repositories of different types of data from various sources are available, and updated at regular intervals. Many state and federal agencies serve the generation of environmental datasets as part of their defined mission, and a number of academic institutions make datasets available as a result of research projects or multi-institution partnerships. These datasets vary in variables, geographic extent, and spatial and temporal scales, and therefore their usefulness depends on the needs of the researcher. Dr McNyset gave an overview of a number sources of environmental data in the United States such as remotely sensed, station based interpolated, site

sampled, repositories like Earth Resources Observation and Science (EROS), Geologic Data Clearing House and National Water Data (Nwisweb) and available datasets like Ecological Monitoring and Assessment Projects (EMAP), U.S. Geologic Survey (USGS), National Water Quality Assessment (NAWQA), USGS GAP Analysis Programme, etc.

In her yet another talk in the eighth session held on the concluding day of the workshop, Dr McNyset highlighted the importance of standardization of data. She gave her perception on data standards and an overview of the quality assurance or quality control (QA/QC) procedures used by US EPA to assure data quality for the Western EMAP, an aquatic bio-assessment dataset of over 1400 monitoring sites from where the data were collected over five years. The data at US EPA is compulsorily subjected to the procedures of QA/QC protocols thereby assuring its authenticity.

Going back to session two, the third speaker Dr Amarnath Gupta from the University of California at San Diego, USA, discussed the importance of data, integrating the information it contained and locating it in a digital repository. He said that owing to the data being heterogeneous and non-structured, their recording in software programmes becomes difficult as they vary in density and form. The data needed to be managed by considering its type, functions by assuming n number of data available in different locations. A single source of information system can be

acquired by setting different data models, schemes, types, query and computational capabilities. Integration should be across many domains and on many types of data. A case study on a project that created an extensive information integration framework for spatiotemporal information arising from marine ecological studies and models was discussed.

Dr Gupta's second talk in the third session on case studies in Ecological Forecasting covered Observation Systems Cyberinfrastructure for the Environmental Sciences. To understand, predict, and communicate the impact of natural and anthropogenic influences on lake and reservoir ecosystems two observation systems called the Global Lake Ecological Observatory Network (GLEON) and Coral Reefs Environmental Observational Networks (CREON) are used for building a scalable persistent network of lake ecology observations. He also mentioned about the sessions organized by National Science Foundation (NSF) on cyberinfrastructure where speakers described the computing capabilities to enable better forecasts of when and where earthquakes were likely to occur and how the ground would shake as a result.

The second speaker in the third session Dr Richard Williams from Biodiversity Research Center, USA, shared his case study of Avian influenza (AI), caused by a group of viruses found in a small number of birds in West Africa. HP-H5N1, a highly pathogenic virus, has resulted

in millions of domestic poultry deaths and now found in a small number in humans has raised an alarm among health officials. Dr Williams focused on emerging diseases resulting in a significant threat to human health, food security, economic development and wildlife conservation. Ecological niche models are a powerful tool in estimating potential distributions, based on human case occurrences or on known occurrences of vector or reservoir species.

The fourth session was on Data Generation, Digitization and the Quality Control Standards Adopted and had eight speakers. Dr C.V.R.S. Vijaya Kumar of Indian Institute of Forest Management (IIFM), Bhopal, emphasized the data needs and its availability on the models mainly used for analysis, understanding, prediction, and decision making. This involves not only the economic, ecological activities but has to address to related policy issues. Therefore, he stressed, the need to capture the uncertainty and dynamic changes underlying in a comprehensive manner that could arise due to structural (setting up of industries and large infrastructural projects) and non structural (various policy interventions, global warming, and natural calamities) pressures created by various changes in intra and inter-related disciplines impacting forest.

Dr Priya Davidar from the Grands Valley State University, USA, stressed the need of biodiversity informatics to include information on current distributional records of plants and animals. Although such

data are available for key species such as tigers, the Asiatic lion, and endemic tree species of the Western Ghats of India, information on the other species is lacking. The data are available in records but not to the general public or the scientific community.

Dr Baban Ingole, National Institute of Oceanography, Goa, referred to the estuarine system of Mandovi-Zuari and Cumbarjua canals which are considered as the backbone of Goan economy. About two-third of the total ores exploited in Goa comes from mines located along the two rivers and almost 90% of the ores are transported through the waterways of these rivers. Mining plays a very important role in the Goan economy. Dumping of effluents/rejects and physical disturbances caused by regular dredging and sand extraction as well as movement of barges also affects the estuarine benthic environment, using benthic data. Dr Ingole discussed the issue of assessment of benthic biota of the estuarine system. The study put emphasis on usefulness of long-term benthic data in assessing the health of marine environment.

Dr A. Arunachalam, North Eastern Regional Institute of Science and Technology, Itanagar, informed about digitizing the database of 4500 flowering plants, 30 gymnosperms, 45 bamboo species, 500 orchids, etc. in the biodiversity hotspot located in Arunachal Pradesh, which would prove vital and instrumental in augmenting the processes of exploration and informatics. He also mentioned about the work done at Bombay

Natural History Society (BNHS) who has collected information on various aspects of the natural history in India and possesses voucher specimens of 26,000 birds, 20,000 mammals, 7,500 amphibians and reptiles, and 50,000 insects. The library contains 20,000 books, 130 theses and 5000 journals and periodicals on the natural history of India.

Dr Bibhad Talukar, Aaranyak, Guwahati, spoke regarding the wild biodiversity in North East India describing its rich and unique array of biological as well as cultural diversity in Eastern Himalaya whose level of species, genetic and ecosystem has attained global recognition as an area of biodiversity hotspot. However, owing to improper documentation, and lack of scientific approach proper conservation and management of biodiversity sites is becoming impossible. To generate basic scientific information from the scattered information, Aaranyak Nature Club (ANC) was formed, which aims at biodiversity conservation in the region and is pursuing a number of initiatives to document species level information since 1998.

The fifth session focused on the Efforts in Ecological Modeling. Dr K. N. Ganeshiah, University of Agricultural Sciences, Bangalore, highlighted the initiatives of his university by presenting case studies on white cedar (*Dysoxylum malabaricum*), Rattan (*Calamus thwaitesii*), sugarcane woolly aphid (*Ceratovacuna lanigera*), etc. explaining the use of niche modeling tools for different situations. A study



predicts vulnerable area where new pests e.g. woolly aphid were likely to occur were borders of Karnataka and Maharashtra. Another situation was exploring new populations for bio-prospecting and relation between genetic and ecological differentiation. The principles of evolutionary ecology predict that populations adapt to new niches due to the process of genetic differentiation. He concluded stating that geographic isolation among species is reflected in genetic differentiation and ecological isolation.

Dr Sarnam Singh, Indian Institute of Remote Sensing, Dehra Dun, discussed the biodiversity information system (BIS) whose objective is to collect and organize the available but distributed spatial and non spatial database into an interactive system that is capable of presenting a user friendly and easily accessible interface. The data collected from the providers are filtered according to their characteristics. These biodiversity and ecosystem data help in decision-making and are sought using geospatial tools of remote sensing and global positioning systems. The data recorded undergo quality assurance and control. A separate forest resource information system has been also built which provides information at a national level along with maps of important protected parks and sanctuaries. Indian Bioresource Information Network (IBIN) serves as a single window for information channel, on diverse range of issues on bioresources for

the country's scientists, bioresource managers, policy makers and entrepreneurs.

Dr Maya Rajasekharan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, highlighted the initiatives of Eco-Informatics Center (EIC), a facility of ATREE for the purpose of enhancing cooperation and exchange of information for biodiversity conservation, and its contribution by way of assembling, organizing and disseminating biodiversity data in the public domain, promoting research and development tools and software including modeling tools. EIC supports a website that provides ecological information to different stakeholders. It contains a comprehensive WebGIS based online data analysis system. Taxonomic database developments have been carried out for grasshopper, butterfly and ant species of the Western Ghats of India, Dr Rajasekharan informed.

Dr M. Irfan Ullah, Regional Maritime Security Initiative (RMSI), Noida, gave an overview of RMSI that provides geospatial solutions and software services to clients worldwide. RMSI is currently focusing on mapping forest types (phyto-ecological mapping), management planning for reducing human - elephant conflicts under climate change scenarios, planning biodiversity conservation, mapping crop acreages and productions and modeling coconut mite infections, and infectious diseases (like H5N1) and probable disease outbreaks.

Dr Gautam Talukdar, Centre for Development of Advanced

Computing, Pune, shared his views on the Geomatics Solutions Development Group's (GSDG) services in the fields of remote sensing image processing, photogrammetry, spatial analysis and modelling, software customization, web GIS application development, etc. Dr Talukdar gave an overview of geomatics projects in implementing the application areas of e-Governance, natural resources management, environment, health, infrastructure and land management. One of the important initiatives in ecological/environmental modeling at GSDS, in association with National Remote Sensing Agency, Department of Space, is biodiversity characterisation at landscape level using satellite remote sensing in Bihar and Maharashtra. This initiative aims to predict the biological rich areas in these regions using principles of landscape ecology. Different indices like interspersion, juxtaposition, porosity and patchiness, would be used to estimate the Disturbance Index (DI). This index coupled with phytosociological data and terrain information results in the biological richness map forms a significant input for conservation prioritization.

The sixth session focused on Emerging New Data Types and Data Sets. Dr M. S. R. Murthy, National Remote Sensing Agency, (NRSA), Hyderabad, expressed his views on the impact of two types of data namely human interventions data that take into account logging, land conversion, burning, etc. and natural processes data involving climate, erosion, etc. and studying

their effects and structuring them for biodiversity purposes. He said that taking into consideration the existing and emerging models capable of predicting land use and land cover (LULC) change, species niche and forest stand growth would be the primary tools for forecasting ecological trends. Studies on ecological niche, LULC change, productivity models and intensive field experimentation will provide explicit geospatial databases and understanding for an ecological forecast. The communication tools such as the internet GIS (Web GIS) and the pervasive role of wireless GIS implemented through internet and geo-stationary satellite communications through VSAT's (e.g. INSAT systems, etc.) may find a long way into the effective data capture, integration and modeling. Efforts towards development of Information systems like BIS, IBIN, INFFRAS, WALIS, LULC-WEB developed as part of DOS programmes would also be necessary to facilitate integrated modeling, forecast and spatial decision support systems.

Prof. Madhav Gadgil, Agharkar Research Institute, Pune, discussed the importance of biodiversity register that focuses issues on a three tiered management structure for National Biodiversity Authority, state level biodiversity boards and local level biodiversity management committees. Highlighting the issue of local bodies in the country, Dr Gadgil gave an overview of the documentations that needed to be documented in the form of People's Biodiversity Registers (PBR). These

documents would include (i) a comprehensive information on availability and knowledge of local biological resources, medicinal or any other traditional knowledge associated with them; (ii) data about the local *vaids* and practitioners using the biological resources and (iii) details of the access to biological resources and traditional knowledge, details of the collection fee imposed and details of the benefits derived and the mode of their sharing. He said it would be a novel activity to prepare PBR that would involve people at the grass roots in a scientific enterprise. This would include documentation and knowledge of biodiversity related issues in bilingual form, open for continued updating and giving outputs in the form of videotapes or reports and finally information would be categorized as the one shared with wider society and the other confidential one maintained under restricted local access.

Dr Rajasri Bhattacharya, Indian Institute of Forest Management (IIFM), Bhopal, spoke on the growing demand for medicinal and aromatic plants (MAP) in national and international market *vis a vis* their cultivation. She stressed on integrated conservative programmes both *in situ* and *ex situ* and involve stakeholders support policy framework and constraints related to conservation activity. Dr Bhattacharya gave an overview of the role of bioinformatics in conservation of medicinal plants and detailed on PLANTCON a database on conserving these plants.

Dr Vijay Barve, Foundation for

Revitalisation of Local Health Traditions (FRLT), Bangalore, expressed his views on traditional knowledge available within communities which needs to be incorporated in biodiversity information system. He said that the greatest challenge is to link traditional knowledge (Ayurveda) which follows a polynomial system of nomenclature with modern sciences (botany) which follows a binomial system with reference to plants. The modern classification of plants is according to Families and Genus based on morphological characters where as Ayurvedic system follows clinical classification of *Ganas* and *Vargas*. Consequently, establishing botanical identity of an Ayurvedic entity itself becomes a challenge.

Mainly focusing on Ecological Forecasting for Planners and Citizens, the seventh session had three speakers. Dr K. Krishna Kumar from Indian Institute of Tropical Meteorology, Pune, spoke on changing climate and its impact on eco-systems in India. He shared maps drawn from observations depicting annual temperatures, sea surface temperatures, long-term regional trends in Indian summer rainfall, and development of climate models for over last 25 years, present and future. He also presented the statistics pertaining to forests in the country which has the dominant forest types like the tropical dry deciduous (38%) and tropical moist deciduous (32%) forests, and other important forest types like the tropical evergreen, tropical dry thorn, sub-tropical pine and alpine



forests. The value of goods and services provided by the forest sector is estimated to be nearly US\$ 5.8 billion. There is a clear indication of global warming in the Indian surface air temperatures but it has no significant effect in the all-India Mean Monsoon Rainfall. The extreme events appear to have increased in their frequency and intensity and the future climate model projections indicate a slight (~10%) increase in the mean monsoon rainfall and 2-3°C change in the surface temperatures by the later part of 21st century over India. But the large uncertainties associated with the estimation of future emissions and climate model biases have to be borne in mind while framing policy decisions.

Dr Aravind Jha from Conservator of Forests, Maharashtra, expressed his views on the requirements of planning and governance in forest areas. Giving an overview of different acts, sections and articles of law, Dr Jha pointed out the situation of forest and cultivable non forest areas stating that over 4.6 crore population in Maharashtra still uses firewood for cooking meals which means using 57,000 metric tonnes of firewood per day. Over 53 million ha of non forest public or private wasteland exists in the state and the impact of global warming may lead to more humid or cooler climate with consequential impact on forests resulting in disappearance of gregarious species such as teak by the end of 21st century. He also mentioned about NTFP, a project that contributes by generating financial income through trade for

the rural poor. It is estimated that nearly 50 million tribal population and 200-300 million rural poor depend on NTFP for their livelihood to varying extent.

Dr S. P. Bagade from Groundwater Survey and Development Agency, (GSDA), Maharashtra, discussed impact of water resource development on the ecosystem in the State of Maharashtra. His presentation brought out the importance and availability of water in natural form and the dependency of agriculture on rain water in the early 1960s. During 1990 to 2000 water became scarce and therefore rain water needed to be managed carefully. The need to conserve water in rural and urban areas in a systematic manner is required by taking into account the data sets at micro levels. Dr Bagade also spoke on initiatives taken by the Government of Maharashtra by enacting various acts like State Ground Water Authority (SGWA) for implementation of Maharashtra Ground Water (Development & Management) Act, 2007 and policies towards water resources.

The workshop concluded with a Joint Statement on Ecological Forecasting which endorsed the commitment to a continuing cooperation among the two national biodiversity communities. It recognized the common interest and expressed that to develop cooperation, a commitment to share resources, funding, and commitment to international standards was required. These collaborative efforts would contribute to scientific understanding and global objectives

in ecological forecasting. The importance of sharing scientific data and information and to open source, have public access software and information resources was stressed. To ensure the vibrancy of the collaboration, the statement assured proper credit and recognition to be given to those who contribute towards intellectual assets. Broad areas of common interest were identified as listed below:

- Develop primary biodiversity data infrastructure to provide biological information,
- Develop geospatial data infrastructure to provide information on the ecological and environmental context,
- Develop and enhance conceptual and software tools for ecological forecasting,
- Encourage development of effective standards for standardization, enabling, and quality-control of biodiversity information,
- Build capacity in ecological forecasting for scientists from both countries,
- Encourage development of demonstration applications treating key topics such as biodiversity conservation, climate change effects on biodiversity, keystone species, indigenous biodiversity knowledge, economically and medicinally important species, disease transmission and public health, and invasive species and
- Promote joint proposals to promote this cooperation via funding from such institutions as the Indo-US Forum, and DST-NSF.

NAL celebrates its Foundation Day

The National Aerospace Laboratories (NAL), Bangalore, celebrated its Foundation Day on 7 September 2007 at the Valluri Auditorium of NAL.

Air Chief Marshal F. H. Major, the Chief Guest on the occasion, delivered the 21st NAL Foundation Day Lecture on 'Strategic Aerospace Power: Technological and Maintenance Challenges'.

The Air Chief felicitated NAL for its 48 glorious years of service to the nation. In particular, he mentioned the good services rendered by NAL to the IAF. He said that air power reflected the national power and stressed on the need to develop high end indigenous technology backed by research for the country's military power to have an upper hand over adversaries. A strong aerospace power was necessary for the country's security. Aerospace dominance could be achieved only through cutting edge technology. Commending NAL on its contributions, he said that *SARAS* had great potential and the IAF was eagerly looking forward to its passing the certification tests. Stressing the need to invest more on R & D in aerospace technology, the Air Chief said that the national security policy needed to be integrated with

national technology. He was in favour of encouraging private sector in defence related research.

Earlier, in his welcome address, Dr A. R. Upadhyya, Director, NAL, spoke about the importance of the Foundation Day and said that it has been an emotional event at NAL. He paid homage to the former Director, late Dr P. Nilakantan whose vision and effort led to the founding of NAL and its major facility – The 1.2 m Trisonic Wind Tunnel. NAL was also fortunate to have had equally capable directors to succeed Dr P. Nilakantan, and they have nurtured the laboratory.

Stressing on the strong ties NAL has with the IAF, Dr Upadhyya mentioned that NAL had carried out several important projects for the IAF. He expressed NAL's gratitude to the IAF for the interest and valuable support provided for the flight testing of *SARAS*, and said that 'We would be happy to see our *SARAS* flying in the Indian skies with the IAF colours'.

The Air Chief Marshal distributed NAL's 'Special Recognition' awards to ASTE flight testing team and DGCA flight certification team in appreciation for their contribution to the *SARAS* project.

The tenth NAL Technology Lecture was delivered by Dr Sekhar Majumdar, Head, Computational and Theoretical Fluid Dynamics Division, NAL on 'CFD Technology - The NAL Experience'. It was a thought provoking and illuminating lecture.

Dr V. K. Aatre, former Adviser to the Defence Minister presided over the function and released the NAL Annual Report for 2006-07. He distributed the NAL Outstanding Performance Awards and also gave away prizes to children of NAL employees for excelling in the field of sports, academics and extra-curricular activities. In his presidential address Dr Aatre stressed on the need for research and development and the need to invest in academic research. Ninety percent of the academic research was sponsored by government, and there was a need to change our attitude towards academic research. He said that the number of people in science and technology research was dwindling and there was a need for a sound policy to arrest this decline.

The function concluded with a vote of thanks proposed by Dr M. R. Nayak, Adviser (M&A). Dr M. N. Sathyanarayana, Jt Head, KTMD, compered the programme.

Multimedia Projection Technology

A salient feature of this year's NAL Foundation Day was the operationalization of multimedia technologies to showcase NAL's capabilities. This 'powerful mode' was put to use during the foundation

day celebrations very effectively.

A multimedia projection system was setup at the S. R. Valluri Auditorium. A sustainable projection quality through a special mid-throw lens was attained from a

challenging throw distance of 65 ft. An optimal screen dimension of 9 ft×12 ft was achieved to project NAL's presentations. Two full-blown multimedia films on *SARAS* put this projection facility to its optimum use



prior to the commencement of the main Foundation Day function.

In addition, the outside corridor of the S. R. Valluri Auditorium had 42" plasma screen to cover the SARAS presentations and also the live telecast of the function. Unlike the conventional television cathode ray tubes, the plasma picture develops spontaneously and is extremely sharp.

At the meeting with the Chief of the Air Staff, at the Director's Conference Hall, prior to the Foundation Day function, Dr A. R. Upadhy, Director, NAL, in his presentation, made it a point to run two documentaries on SARAS.

The documentary on SARAS flight displayed at Aero India 2007 kept the audience in rapt attention, more so as the projection system was fixed with a special wide-angle lens and powered by a 5000 ANSI lumen lamp. Coupled with this was a high-end desktop PC fitted with a 5.1 Digital Theatre Surround (DTS) system. This truly gave it a 'Surround Theatre Effect'.

CIMAP Day Celebrations Medicinal and Aromatic Plants in Integrative Agriculture Mode (IAM) for Impact Agriculture

CIMAP (Central Institute of Medicinal and Aromatic Plants) Day was celebrated on the concluding day of the week-long CIMAP Technology Fest-2007 (4-11 August, 2007). The Chief Guest on this occasion, Prof. V.K. Suri, Vice-Chancellor of C.S. Azad University of Agriculture & Technology, Kanpur, signed an important MoU with CIMAP for R&D collaboration and technology dissemination.

Delivering a lecture on the 'Future Scenario of High-Tech Agriculture', Prof. Suri said that the development of agriculture in India has seen tremendous changes in the last 60 years. Although, India has achieved self-sufficiency in food production but the contribution of agriculture sector to GDP, which was 56% during 1950's has come down to 24% during 2005, which is a matter of serious concern, Prof. Suri remarked. Speaking on the initiative taken in agriculture extension, he said that many programmes were introduced from time to time to address location specific and client based developments. There was a steady progress towards 'technology transfer' aimed at increased food production and attaining green revolution. The public research as well as extension system in the country has contributed significantly to the enhanced food production. The introduction of 'T' and 'V' system during



Dr S.P.S. Khanuja, Director, CIMAP, delivering the welcome address

late eighties across the country contributed significantly towards the speedy transfer of farm technology to our farmers, Prof. Suri said.

Prof. Suri stressed the need for constituting special scientific teams at Krishi Vigyan Kendras (KVKs) to provide specialized extension services to the farmers, besides human resource development by imparting training to the unemployed agriculture graduates in the field of export of agricultural commodities, specialization in specific crops including exposure to marketing and value addition which can help them provide specialized consultancy required by the farmers in specific areas/crops.

Welcoming the guests Dr S.P.S. Khanuja, Director, CIMAP, highlighted the main achievements of CIMAP during last one year. Dr Khanuja further said that medicinal and aromatic plants (MAPs) provide avenues to integrate the potential of commercial as well as social value with food crops in such a way that



Prof. V.K. Suri, Vice-Chancellor, C.S. Azad University delivering CIMAP Day Lecture

food crops while becoming intensive in high value produce, also integrate MAPs as “high income options” in fertile lands and “only income options” in waste and marginal lands. Thanks to the plants’ own biological defense strategy and capability to produce ‘secondary metabolites’, they are able to combat the adversities/stresses whether biotic and abiotic, Dr Khanuja added.

Dr Khanuja told that during 2006-07, CIMAP had organized 40 entrepreneurship training programmes in different parts of the country through which 2384 persons were provided technical knowledge and guidance for cultivation, processing, marketing, etc. for quality production of medicinal and aromatic plants. Five plant varieties and products were released for high tech farming and entrepreneurial opportunities linking rural India to main stream of development. He further said that 10 sponsored projects were completed during this financial year, 30 sponsored projects were progressing according to plan and 19 R&D projects, twelve consultancy projects and one collaborative project were taken as

new ventures. CIMAP has been working as nodal laboratory for two and participating laboratory in fourteen CSIR’s network mode research.

Highlighting the accomplishments in the area of business development, Dr Khanuja told that 11 CIMAP technologies were licensed to industry/entrepreneurs. These include crop consultancy on patchouli and lemongrass to Mr Roger Binny, Bangalore; consultancy for project report for cultivation and processing of MAPs to M/s Margadarsi Chit Funds Ltd, Hyderabad; consultancy for menthol mint cultivation to Emami Biotech Pvt Ltd., Kolkata; consultancy for cultivation of *Artemisia annua* (var. CIM-Arogya) to M/s Disinfecto Chemical Industries Pvt. Ltd; consultancy for vetiver distillation of patchouli to M/s Balagundar Estates Somvarpet; material transfer agreement with M/s NESSO Pvt Ltd, Mysore; designing, fabrication and installation of field distillation unit

to PSCST, Chandigarh; consultancy pertaining to design, drawing of directly fired type field distillation unit to M/s Avadh Nasesh, Etah, UP and Shri M. Rungta, Bihar and licensing of technology for mosquito repellent spray, mosquito repellent cream and hand disinfectant to M/s Vitromed Healthcare, Jaipur.

During the Technology Fest-2007 about 2500 students of different schools and colleges visited the laboratories and research farm of CIMAP. They also interacted with the scientists on various aspects of medicinal and aromatic plants. Students went round the special technology gallery set up on this occasion.



Signing of MoU documents between CIMAP and CSAUA&T, Kanpur



Students visiting Technology Gallery in Gyan-Surabhi Complex



Dr K. Nagarajan delivers Prof. Venkataraman Memorial Lecture at NCL

Dr K. Nagarajan, Corporate R&D Advisor, Hikal R&D Centre, Bangalore, delivered the sixth Professor K. Venkataraman Memorial Lecture at National Chemical Laboratory (NCL), Pune, on 7 June 2007. Prof. Venkataraman, the first Indian Director of NCL, made seminal contributions to the area

of organic synthesis and to the development of industrially important processes for dyestuff industry. He was affectionately known to his associates as "KV". His seven-volume treatise on the chemistry of dyes and dye intermediates has been hailed as a classic. He has the rare distinction amongst organic chemists in India of having a reaction named after him, namely, the Baker-Venkataraman rearrangement for his contribution to the synthesis of flavones at room temperature. Dr Nagarajan spoke on "Endeavours in Organic Chemical Research - Trivial and Not So Trivial".

Dr Nagarajan recalled his association with KV and remembered how he first came in contact with him and his frequent interactions with him in later years. He started with describing Prof Venkataraman's work and his work inspired by KV's work which led to the synthesis of wedelolactone. The



Dr K. Nagarajan delivering Prof. Venkataraman Memorial Lecture

interest in this compound was revived in recent findings of newer activities and its total synthesis. He later described his work on antitubercular research work which resulted in a molecule CGI 17341 which had better activity but could not become a drug owing to mutagenicity. He touched upon the biology and chemistry of this molecule.

He also pointed out that similar scaffolds were later shown by others to be very active and are in various stages of

clinical trials.

Dr Nagarajan also described the theoretical interactions of drugs like nimesulide and meloxicam with cyclooxygenase-1 (COX-1) and -2 (COX-2) enzymes and found that nimesulide is selective COX-2 inhibitor. Lastly, he touched upon solid state and solution phase chemistry of some important molecules like

gabapentin and its analogs and especially fluoro compounds where solid state crystal studies were undertaken and for the first time F-F interactions were observed and generalized. He also revisited the problem of reactions of triphenyltricyclo-octadienes which he had tackled almost 40 years ago and elucidated the structures of compounds which could not be



Dr S. Sivaram giving welcome remarks

assigned at that time with mechanistic details.

Earlier, Dr S. Sivaram, Director, NCL, in his welcome remarks remembered Prof. Venkataraman's contribution to organic chemistry and his association with NCL. He also introduced Dr Nagarajan to the audience. After obtaining Ph.D. degree in 1954 and spending eight

years in post-doctoral research at Presidency College, Chennai, Wayne State University, Detroit, USA, California Institute of Technology, Pasadena, USA, and Zurich University, Switzerland, Dr Nagarajan has been associated with various chemical industries in India in different capacities for the last four and half decades. His

specializations include medicinal chemistry, pesticide chemistry, hetero-cyclic synthesis, application of NMR spectroscopy to natural products and synthetic organic chemistry. The lecture was organized under the auspices of NCL Research Foundation, a non-profit trust created to foster all round excellence in science and technology.

Dr B. G. Unni

Dr B.G. Unni, Scientist F and Area Coordinator (Biological Sciences), North East Institute of Science & Technology (NEIST), Jorhat, attended on invitation, the 9th International Conference on Juvenile Hormone at York City, UK, from 5 to 10 August 2007 and delivered a lecture entitled 'Dimethyl Sulfoxide Inhibits *in vitro* Biosynthesis of Juvenile Hormone I and II by Corpora Allata of Lepidopteran Insects (*Manduca sexta*, *Samia cynthia ricini* & *Antheraea assama*)' in the scientific session on Regulators of Juvenile Hormone Biosynthesis.

The international conference of Juvenile Hormone (JH) covers major

research activities with respect to Juvenile Hormone, from morphological changes to molecular biology and functional properties of JH in insects. The first international conference on JH was held in 1972. Earlier, Dr Unni was invited to attend the 7th International Conference held in Israel (1999) and awarded a fellowship by the Hebrew University, and the 8th conference organized by the



University of Nevada in California, USA and was awarded the Wellmark Research Foundation Fellowship by the University of Nevada to attend the conference. The present conference, ninth in the series, had the participation of 23 countries.

Dr Unni's visit was sponsored by the organizing committee of the conference, Central Science Laboratory, York City, UK; Department of Science and Technology, Government of India; Indian National Science Academy (INSA), New Delhi and H.R. Cama Memorial Award by the Society of Biological Chemists - India, Indian Institute of Science, Bangalore.

Dr V. Kasi Rao

Dr V. Kasi Rao, Head, Documentation Department, Central Leather Research Institute (CLRI), Chennai, attended on invitation, the World Water Week Conference of the Stockholm International Water Institute held at Stockholm during 12-18 August 2007, and presented his paper titled Information and Communication Technologies (ICTs): A Tool for Water Resource Management (WARM) in Industry for Sustainable Development. During the conference, he also delivered lectures on the following aspects:

- IT Strategies and Knowledge Organization Management Skills (KOMS): Need for information products and services towards organization development
- Leather Science Abstract (LESA) and Indexing Services: A tool for leather industrial development.





International Recognition for NGRI Scientists

The National Geophysical Research Institute, (NGRI), Hyderabad's Scientists have bagged various prestigious positions in different International Bodies of Earth Sciences at the General Assembly of the International Union of Geodesy and Geophysics (IUGG) held at Perugia, Italy, during 2-13 July 2007.

- Dr V. P. Dimri, Director, NGRI and Chairman of National Committee of IUGG, attended the IUGG Council Meetings and presented National Report 2003-07 during the General Assembly.
- Dr Harsh Gupta, Raja Ramanna Fellow and former Secretary to Government of India, DoD, and former Director, NGRI, has been elected as the Vice-President of IUGG for 2007-11.
- Dr T. Harinarayana, Scientist and Project Leader, Magnetotelluric Group, NGRI, has been elected to the Executive Committee of International Association of Geomagnetism and Aeronomy (IAGA).
- Dr Kalachand Sain, Scientist and Project Leader, Gas Hydrates Group, has been appointed as Bureau Member of International Lithosphere Programme (ILP).
- Dr Sukanta Roy, Scientist, has been elected to The Bureau of the International Heat Flow Commission (IHFC) of the IASPEI for the period 2007-11.

IUGG organizes an international symposium once in 4 years, and earth scientists from different countries participate in the assembly to share their research experiences and scientific findings. Over 6000 scientists from 92 countries, working in various fields of earth sciences, participated in this General Assembly.

HEDA Award for Dr S.C. Nath

Dr S. C. Nath, Scientist F, North - East Institute of Science and Technology (NEIST), Jorhat, has been conferred the 'Life Time Education Achievement Award 2006' by Health and Education Development Association (HEDA), New Delhi, for his significant research contributions to the area of medicinal, aromatic and spice plants. Dr Nath's major areas of research include preparation of inventory, characterization and development of new plant resources of economic value for sustainable use. He has discovered many economic plant species and new sources of import substitution products from the flora of North-East India having vast potential for use in perfumery, flavouring and pharmaceutical industries besides undertaking the documentation and validation studies of folklore medicinal plants of the region. Dr Nath has also contributed significantly towards the fundamental aspects of plant sciences by describing new taxa and new stomata to plant kingdom and developing new keys and technique to angiosperm taxonomy apart from standardizing methods for propagation of a number of new industrial crops and preserving live plant germplasms of many rare, endangered and threatened species of academic and commercial importance through the development of botanic gardens at NEIST. A Fellow of the Linnean Society of London, Indian Association of Angiosperm Taxonomy and Society of Ethnobotanists, India, Dr Nath has so far 133 research papers, 27 science articles, 13 radio talks and 4 patents to his credit besides being research guide to many Ph. D. students. Dr Nath is also the recipient of Assam Science Society's P. C. Goswami Award and Dr B. M. Das Memorial Science Award in 1993 for his research contributions in the area of Plant Sciences and Economic Botany. Dr Nath's name has been enrolled in the 'International Directory of Specialists in Herbs, Spices and Medicinal Plants' compiled and published by the University of Massachusetts. USA.