

## Women scientists meet in Delhi on International Women's Day\*

Recently New Delhi's Vigyan Bhawan – a hub for high-level seminars addressed by Heads of State – witnessed a conference with a difference. On 8 March, International Women's Day, a majority of women participants came together to discuss science, an area in which almost all visible faces are male! It was also befitting that the first woman President of India, Pratibha Patil inaugurated this landmark conference. The inaugural function at the Plenary Hall with a capacity of over 1200 was packed with women participants, with only a sprinkling of men.

The conference was the brainchild of the Task Force (TF) on Women in Science, formed after the Scientific Advisory Council to the Prime Minister recommended the setting up of a body that would ensure the interests of women practitioners of science. A fourteen-member TF came into existence in December 2005, with Mahtab Bamji as the Chair (see <http://www.indianwomenscientists.in/>). The TF is expected to identify and recommend to the Government measures which are required to encourage women to take up science as a profession, as also measures which will help in their retention and career development. TF realized the need to give publicity and visibility to the competent work done by women scientists and technologists in this country and hence organized this conference.

Over 700 women participated in the scientific sessions bringing together women scientists, technologists, teachers, students and entrepreneurs from across the country from many diverse fields. The first conference of women scientists of a similar nature was organized under the leadership of Manju Sharma, then Secretary, Department of Biotechnology, in 2002.

Pratibha Patil, in her inaugural address questioned whether women are given the necessary education, skills, options and a level playing field. 'Can we overcome societal biases against women? Can we fight against social evils and discrimination against women? Only if the answer to these questions is in the affirmative,' she

said, 'will we achieve gender equality'. She also conferred the National Awards for Women's Development through Application of Science and Technology for the year 2007 and the Women Bioscientists Award. She expressed hope by saying 'Women scientists can bring about significant social change by working at the grassroots level for women's empowerment through the application of science and technology.'

Girija Vyas, Chairperson, National Commission for Women, in her special address referred to the increase in crimes against women and the need to implement legislations to protect women at the workplace. She felt there was need to educate girls in rural areas as education was the only means of empowerment.

Kapil Sibal, Union Minister for Science and Technology, and Earth Sciences, took the lead to announce concrete measures – all DST-aided institutions would be provided financial support to establish state-of-the-art crèche facilities. DST's scientific institutions would start flexible working hours for women scientists with children up to the age of 3 years, with provision to work from home. These flexi-timings will be allowed for a total of 3 years. All women who are young associates of Indian National Science Academy, will be provided a research grant of up to Rs 10 lakhs a year for a period of 5 years, and support will be provided by the Government to build a residential block for women employees in all scientific institutions having more than 20 women scientists. The Minister also stressed that other scientific departments must ensure that these measures are implemented in their departments.

The first scientific session of the conference had six plenary lectures. Importance of cell survival and cell death in the life of multicellular organisms was the focus of the lecture by Chandrima Shaha (National Institute of Immunology, New Delhi). More specifically, she discussed some of the concepts with the help of data from her own laboratory regarding death of *Leishmania donovani*. She mentioned that response of *L. donovani* to oxidative stress is similar to other metazoans, and death involves the mitochondria. Climate change being one of the relevant topics globally, Sandhya Rao (INRM

Consultants, Delhi) talked on the assessment of climate change in the context of its impact on Indian water resources. With the help of data she showed how water stress is likely to be exacerbated leading to shortage in some regions and flooding in other regions. Drought-affected areas may increase in extent. Heavy precipitation events may increase in frequency, resulting in increased flood-risk. Complexity of brain function was discussed by Shubha Tole (Tata Institute of Fundamental Research, Mumbai). She showed how development of the hippocampus, that part of the cerebral cortex which controls memory, is regulated. She discussed various signals and switches which helped her team characterize some of the developmental issues involved. Many scientists in India have been working on nanomaterials for several years and Sulabha Kulkarni (University of Pune) illustrated a variety of applications of nanomaterials based primarily on her work, and also from others. Her team has developed a variety of semiconductor and metal nanoparticles whose optical properties vary with particle size or shape in biosensors. She discussed their use in laser welding of cells, field emission displays, amongst others. Usha Vijayraghavan (Indian Institute of Science (IISc), Bangalore) discussed developmental biology questions in the context of plants. She discussed how the role of master regulators gets refined with research and how they choreograph flower formation. She discussed these by illustrating her own work on *Arabiopsis* floral organs. Light combat aircraft, a single-seater engine fighter aircraft, is the world's smallest aircraft and a crucial component of the Indian Air Force. Indira Narayanswamy (Aeronautical Development Agency, Bangalore) described her aerodynamic studies for the aircraft optimization. More specifically, she described her work in computational fluid dynamics, which involves testing various aerodynamic loads for checking the capacity of the aircraft.

On the second day there was further discussion on the six themes of the conference. In a session where developments in plant biotechnology were discussed, Paramjit Khurana (University of Delhi) presented her work on genes and geno-

\*A report on the conference entitled 'Showcasing Cutting-edge, Science and Technology by Women' held on 8 and 9 March 2008 at New Delhi.

mies for crop improvement; Vidya Gupta (National Chemical Laboratory, Pune) discussed molecular approaches for crop improvement taking chickpea as an example. Potential applications of research in plant viruses were discussed by R. Usha (Madurai Kamaraj University), whereas Vibha Dhawan (The Energy and Resources Institute, New Delhi) talked about the contribution of biotechnological approaches in the growth of Indian agriculture. Climate change was the theme for another session, where the discussion was about how climate change is affecting various aspects of our eco-system. Impact on agriculture was presented by V. Geethalakshmi (Tamil Nadu Agricultural University, Coimbatore). Impact on health with special focus on malaria was brought to light by Sumana Bhattacharya (Winrock International India, Gurgaon). The effect on the forests in India was the theme of the talk by Indu Murthy (IISc). Joyashree Roy (Jadavpur University, Kolkata) covered the economic and social dimensions of climate change affecting Sunderban's mangroves and air pollution was the focus of Rashmi Patil's talk, where she presented her work from Indian Institute of Technology, Bombay.

Infectious disease research is a strong area in biology in India. Some of the recent developments in this area were the focus of another theme. While interplay between mycobacteria, which cause tuberculosis, and macrophage signalling pathways was presented by Joyoti Basu (Bose Institute, Kolkata), Sudha Bhattacharya (Jawaharlal Nehru University, New Delhi) discussed work from her laboratory concerning differential regulation of palindromic transcription units in the ribosomal DNA circle of *Entamoeba histolytica*, a parasite which causes dysentery and liver abscess. Namita Surolia (Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore) presented her work on developing strategies and identifying targets for the treatment of malaria. Saman Habib (Central Drug Research Institute, Lucknow) also works on malarial parasite and presented data on DNA-protein interactions involved in replication and organization of the *Plasmodium falciparum* apicoplast genome. Cholera still causes a lot of morbidity in the Indian population and Rukhsana Chowdhury (Indian Institute of Chemical Biology, Kolkata) discussed how expression of certain virulence associated genes of *Vibrio cholerae* is regulated.

Women scientists and engineers from the defence research establishment presented their work on various aspects of aerospace and defence research. Statistical approach for certification of materials, components for airworthiness was a focus of the talks by Hina Gokhale (DMRL, Hyderabad). I. Manjula (DLRL, Hyderabad) gave an overview of advances in personal wireless communications. N. Ranjana (Advanced Systems Laboratory, Hyderabad) explained how software designing, verification and testing is done for embedded systems in missiles. An update on software engineering in C4I scenario was provided by V. Prameela and her team (DRDL, Hyderabad). Jhumur Lahiri (Advanced Systems Laboratory, Hyderabad) gave an overview of composite materials which are used for missiles and aerospace systems and NDE technologies. Debarati Bhattacharjee (DMSRDE, Kanpur) informed the audience about how to predict thermal properties of textiles.

A session on nanotechnology and nanoparticles covered different aspects of this emerging field, reflecting its multidisciplinary nature. Tanusri Saha-Dasgupta (S.N. Bose National Centre for Basic Sciences, Kolkata) discussed how quantum mechanical calculations can help us determine the basic structural arrangements of atoms in such small nanoparticles. Charusita Chakravarty (Indian Institute of Technology, Delhi) showed how classical simulations can help us understand the way in which nanosized objects 'self-assemble' into a variety of arrangements. Yamuna Krishnan (National Centre for Biological Sciences, Bangalore) described experiments by her group to construct nano-architectures using DNA molecules as building blocks. Sadhana Rayalu (NEERI, Nagpur) discussed the use of biomimetics to tackle environmental challenges, such as cleaning-up water sources and the environment. Lakshmi Kantam (Indian Institute of Chemical Technology, Hyderabad) discussed the use of nanocatalysis strategy for environmental protection and industrial efficiency.

The proportion of people from India affected by non-infectious diseases has been going up steadily over the past many years. The sixth theme covered topics related to this area. Incidence of diabetes mellitus is increasing and A. C. Ammini (All India Institute of Medical Sciences, Delhi) discussed the cost-effective management of this disease.

Many researchers are working in the area of stem cell biology. Geeta Vemuganti (L.V. Prasad Eye Institute, Hyderabad) discussed some work about cell therapy for ocular degenerative diseases. Similarly, Jyotsna Dhawan (Centre for Cellular and Molecular Biology, Hyderabad) focussed on quiescence of the muscle cells and its implications for stem-cell function. B. K. Thelma (University of Delhi) described the current status of human genome research and potential health benefits based on her work of mapping genes for various human diseases. Nutrition plays a significant role in one's life and Shobha Rao (Agharkar Research Institute, Pune) illustrated the connections between maternal micronutrient (un)availability, its impact on the foetus and how such deficiencies manifest during adulthood.

Many young girls these days opt for the science stream. However, compared to jobs in academia or industry, women as leading entrepreneurs in the biotech industry are rare. A special session was organized where a few first-generation CEOs were invited. Mahima Datla (Biological Evans), Sushama Srikandath (AVT McCormick), Anuradha Acharya (Ocimum Biosolutions) and Jayashree Sathyanarana (Dream Finders) talked about how they managed to enter and establish themselves in their respective fields of entrepreneurship.

There were opportunities available to discuss policy issues as well. On the first day itself women participants received a questionnaire from the organizers. A feedback on the difficulties they faced while negotiating work and family responsibilities successfully was sought. C. N. R. Rao (Jawaharlal Nehru Centre for Advanced Scientific Research), in his special lecture also mentioned the difficulties and possible avenues that could be chosen to address the problems. Sujata Manohar (retired judge of the Supreme Court of India), Vijayalakshmi Ravindranath (National Brain Research Centre, Manesar) and Rohini Godbole (IISc) shared their thoughts about sexual harassment and discrimination at the workplace, concerns about why women drop out of promising careers and what can be done to prevent it. This session saw a large number of women sharing their opinions and concerns.

On the second day of the conference, the feedback received via questionnaires, talks, discussions, etc. was compiled and presented to the Heads of various science

departments. The TF members participated in all these deliberations and the conference provided yet another opportunity to gather inputs from women present under one roof as participants.

Not only women scientists, but women technocrats, college teachers, women CEOs, college students and school students were present during different sessions. The only time a few men were present during the two-day conference was at the inauguration. In fact, during an interactive session a pointed comment was made about the absence of men, with women wondering whether they were talking amongst themselves, and whether

talking to the converts has any relevance at all.

While such conferences serve the purpose of providing exposure to competent work done by women scientists and technologists to the world, in general, absence of male colleagues meant that women's work and achievements went unnoticed by their male colleagues, competitors and bosses. Pursuit of science is not done in isolation, but is a globally collaborative activity. Thus, listening to each other's work is a professional necessity. Since in today's world of science and technology women are in minority, their existence is unrecognized. Absence

of male colleagues from this conference, thus defeated part of the purpose of the showcasing effort. The lesson to learn from this effort is not to organize women-only conferences, but to strive for a near-equal representation of both the sexes as speakers and participants, even if that has to be achieved by affirmative action!

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## MEETING REPORT

### Combating land degradation for sustainable agriculture – Is conservation agriculture the way forward for India?\*

The need to address land degradation becomes critical looking at expectations from agriculture productivity to meet needs of food security in the country. Conservation Agriculture (CA) practices as pursued in many parts of the world are build on agro-ecological principles making land use more sustainable and thus helping farmers use agricultural inputs more efficiently. 17 June 2008, being observed by the United Nations Convention to Combat Desertification (UNCCD) as World Day to Combat Desertification, offered a perfect opportunity for Professional Alliance for Conservation Agriculture (PACA) to bring together concerned professionals involved with the subject of agriculture and environment to promote the cause of CA. The meeting focused on deliberations around the subject 'Is conservation agriculture the way forward for India?'. The meeting attended by over 35 participants brought together concerned stakeholders, mostly

practitioners and believers in the cause of CA and included scientists from Indian Council of Agricultural Research (ICAR), the international agricultural system, State Agricultural Universities (SAUs) and policy makers.

The opening session began with Sanjeev Vasudev (Society for Strategy, Technology & Delivery for Development) welcoming the delegates on behalf of PACA and highlighting the need for CA to reflect on food security situation the world is facing today. The brief introduction paved the way for the inaugural presentation by R. S. Paroda (formerly at ICAR), Trust for Advancement of Agriculture Sciences, who chaired and made a presentation on the 'Major concerns of Indian agriculture'. He related these to global concerns such as climate change, land degradation, droughts, desertification, declining buffer stocks of food crops world over, need for linkages to the market, increasing role of private sector and farming systems approaches. Dwelling on three UN Millennium Development Goals (MDGs) relevant to agriculture, eradication of extreme poverty and hunger (MDG 1), he stressed for ensuring environmental sustainability (MDG 7) and expressed the need for developing a global partnership for development (MDG 8). He referred to the need to take the knowledge from basic sciences and translate them into practical

products/agricultural innovations. He stressed benefits of participatory research with scientists working on farmer-field locations, illustrated through successful cases in Central Asia and India. He ended by reminding that path ahead was not likely to be smooth and strategies to meet the goals of sustainability would emerge only from customized eco-regional approaches.

R. B. Singh (formerly at FAO) deliberated on 'Reforming agriculture to meet needs of climate change with specific reference to land degradation'. The presentation addressed two important issues: land degradation and desertification and emphasized the need to understand the processes of desertification beyond technology dissemination. Footprints of agriculture on climate change were a matter of both economic and ecological concern. He shared findings from National Farmers Commission with special reference to farmers in rainfed areas and expressed the need for market stabilization fund or AgriRisk fund to meet farmers' livelihood requirements and ease migration pressure. A hint of caution was sounded with respect to crop diversification especially related to rice and wheat that may harm cereal needs of the nation. He concluded that partnership amongst stakeholders will pave the way for India to assume a leadership role in south Asia with CA as the way forward.

\*A report on the meeting 'Combating Land Degradation for Sustainable Agriculture – Is Conservation Agriculture the Way Forward for India?' held at the NASC Complex, Pusa Campus, New Delhi on 17 June 2008. The meeting was organized by PACA, a joint initiative by the Society for Strategy Technology Delivery for Development and the Centre for Advancement of Sustainable Agriculture.