

## The Indian Science Congress\*

'Food, nutrition and environmental security' was the focal theme of the recently concluded Indian Science Congress. For the first time in the history of the Congress, augmenting the theme, was an invitation extended to progressive farmers to attend the Congress. Several scientists, farmers, students, NGOs, the public and the media attended the Congress, whose aim, according to one top scientist was 'to serve as a forum for interaction between individuals from diverse backgrounds and not merely a science and technology meet'. Also for the first time, farmers, whose inventions were supported under the Technopreneur Promotion Program (TePP) under the Ministry of Science and Technology were present. Some of the farmers felt that by attending the Congress they had gained technical information on new varieties and value-added products. However, it was felt by some that they should be represented for some relevant sessions in agriculture, with the help of interpreters to facilitate interaction with scientists.

Against this backdrop, serious issues such as hunger, malnutrition and environmental degradation that continue to loom large, were discussed as part of eight plenary sessions and four public fora. Also, there were 42 sectional symposia and 24 concurrent sessions on contemporary issues in various scientific disciplines and a programme 'Science for Children'. At this point in time, India has a record harvest of nearly 206 million tons. With the population growing in India at the rate of 1.8% per year, an estimated food grain requirement of about 260 million tons is envisaged by 2025, when much of it is to be grown on rapidly diminishing arable land area. This will put a great strain on our present natural resources, making it all the more important to resort to ecologically sustainable agricultural production, while increasing the need for nutritional crops that can combat 'hidden hunger' caused by deficiency of micronutrients.

In his Presidential Address, R. S. Paroda (Director-General, ICAR and

General President of the Congress) said that the theme 'Food, nutrition and environmental security' symbolizes the three basic needs which any civilized society must guarantee to its people. In order to achieve a 'Food Secure India' by 2015, 'we must double our food production in the next decade', he said. The emerging challenges are due to our natural resources at risk from soil degradation, deforestation, water scarcity and contamination, biodiversity loss and climate change. He also said that water availability to the agricultural sector would reduce from 89 to 75% by 2020, affecting our capacity to produce more food. The crucial issue is to continue building our human resource in order to compete globally. He spelled out his strategy of 'Panch Sutras' (consisting of 5 Ps) for creating a rich and just society through an integrated scientific intervention. These are: people, productivity, permanency, policy and partnership. He said that the new world trade regime, following the formation of the World Trade Organization (WTO) had also thrown open many challenges. He also emphasized that moving towards an 'evergreen revolution' through diversified agriculture, precision farming, resource conservation and value addition was needed to attain the food, nutrition and environmental security for Indians.

In his Inaugural Address, Prime Minister Atal Bihari Vajpayee said that what we are facing today was 'a shortage not of food, but of facilities to store food'. Malnutrition threatened the brain development of children, with 50% of pregnant women and children being anaemic. Agricultural environment had been affected by increase in food production, therefore making environmental security no longer a peripheral issue to food and nutrition security. He pointed out that there has been qualitative and quantitative degradation of land, water and bio-resources; yields were down due to wrong cropping patterns and faulty usage of fertilizers and acute depletion of the water table. He also said that in the New National Storage Policy with the help of private investment, modern silos at 20 locations would take care of buffer stocks; restructuring of the Food Corporation of India and removal of the weak links in the food chain. He stated that we

are entering the era of 'precision agriculture', which is knowledge intensive and uses the latest that science has to offer, such as biotechnology, information technology, space science, nuclear science and genetic engineering. 'Lab to land' remained a nice sounding slogan. He said that in order to close the gap between the scientist and the farmer we need to supplement the slogan with a new one, 'Land to lab'. Funding needs of Indian science can be met by 'a public private partnership'. He was happy to note that Indian industry was 'beginning to respond to the opportunities in the knowledge industry'.

V. S. Ramamurthy (Secretary, Department of Science and Technology) reporting on the recommendations of the 87th Session of the Indian Science Congress spoke of the Rs 50 crore grants each for the India Millennium Missions to be executed by Technology Information, Forecasting and Assessment Council (TIFAC) and the New Millennium Technology Leadership Initiatives by CSIR. A New Drug Development Foundation was soon to be set-up with a budget allocation of Rs 150 crores. Manju Sharma (Secretary, Department of Biotechnology) said that a Department of Biotechnology initiative for a Biotechnology Park, a technology incubator for women has opened in Chennai, with several others proposed. A taskforce to look into problems of women and science had been set-up under SAC-C, whose recommendations would be implemented next year. A new science and technology policy would be finalized in the next few months, according to Ramamurthy. Three core issues would be part of the new policy, namely the universality of science and its global competitiveness, evolution of local technologies and a social perspective.

In the session on 'Improving productivity and alleviating poverty', G. S. Khush (International Rice Research Institute, Manila) spoke of 'closing the yield gap' by use of genetic engineering to increase tolerance of rice to salinity, drought and waterlogging so as to increase the present 5 tons/hectare yield to a potential of about 10–13 tons/hectare in the tropics, with use of optimum breeding and management practices. Uma Lele (World Bank) compared the various

\*A report on the 88th Session of the Indian Science Congress held during 3–7 January 2001 at the Indian Agricultural Research Institute, New Delhi.

growth and development parameters between China and India over three decades and said: 'If India is to join the true ranks then there is need to understand how to mobilize science to change our economic and investment policies'.

In the session on 'Nutritional needs for human health', V. Ramalingaswami (AIIMS, New Delhi) painted an absolutely grim picture of the fact that 47% of children are underweight and 46% under 3 years of age are stunted. He said that retardation of growth was caused by protein calorie malnutrition. Powerful non-clinical intervention methods such as education of girls, equal opportunities for women, together with 'mother and child' approach would help in combating malnutrition. He added, 'From an agenda of welfare we must move to an agenda of rights'. 'Home gardening, i.e. nutrition gardening is the key to fight micronutrient deficiencies as has been successfully demonstrated in Narsapur Mandal of Medak district of Andhra Pradesh', said Mahtab S. Bamji (Dangoria Charitable Trust, Hyderabad). This coupled with 'Poshana', a low-cost cereal pulse-based complementary food developed by the Trust and establishing a 'Poshana bazaar' or social marketing centre in the village has led to combating malnutrition at the village level. N. Kochupillai (AIIMS, New Delhi) spoke of the fertile Bihar-East Uttar Pradesh areas where impoverished people live, whom planners describe as 'lazy'. However, there is a reason, 'their diminutive build and disproportionate body, slow response to stimuli and dull apathetic expression, tardy reflexes and physical sluggishness were all symptomatic of some overwhelming patho-biology'. He said that the root cause is iodine deficiency – a micronutrient required for growth and development of the human body. There is cause for concern of the recent decision of the government to lift the ban on consumption of non-iodized salt, the impact of which will surface in due course. Clinically significant vitamin-D deficiency amongst Indians also needed collaborative scientific work between agricultural and medical scientists, he added.

Finally, in the session on 'Public policies for food, nutrition and environmental security', Ismail Serageldin (former Vice-President, World Bank and Chairman, Consultative Group on International Agricultural Research, Cairo) felt that 'in

context of global food security, the response should be to produce differently, not less; to use sustainable precision farming that has the best of science and management'. He stressed the need 'that scientists must speak out on public policies affecting food, nutrition and environmental security' and gave information about an International Movement for Scientific Responsibility. M. S. Swaminathan (Chairman, M.S. Swaminathan Research Foundation, Chennai) said that stockpile of research information must be used in 'integrated natural resource management, learning to work with the private sector' and that 'we must fight to incorporate ethics and equity principles in the WTO agreement. He urged the government to bring out a white paper on the WTO agreement and Indian agriculture'. He reiterated this in his evening lecture titled 'Shaping our agricultural future'.

In a public forum on 'Science and technology', to bring together presidents of national academies of science on a single platform, N. K. Ganguly (President, National Academy of Medical Sciences) spoke on health issues posed by climate change. Anil Kakodkar (President, National Academy of Engineering) described the relevance of irradiation to food security, while V. L. Chopra (President, National Academy of Agricultural Sciences) explained how 'collective effort of the academies might provide an avenue' to solve the problems that science and scientists in India face.

Public fora on 'GMOs and genomics', 'How food secure is India' and 'WTO and Indian agriculture' addressed issues of concern. Significant highlights were that India would soon have a Protocol on Biosafety to safeguard against any risks from genetically engineered plants. Serageldin later emphasized the need for strong regulation of all foods and labelling for informed consumer choice and the necessity for a comparative study of risks for different foods and their genetically modified counterparts.

A. P. J. Abdul Kalam (Principal Scientific Adviser to the Government of India) in his lecture entitled 'Networking multiple technologies for nation building' said that to achieve a GDP growth rate of 6–10%, networking between government and all sections of society in the five core areas is necessary. These areas, laid out in the '2020 Technology vision document', are agriculture and food process-

ing, production of quality electric power, education and health care, information technology and development of strategic sector technologies such as space, nuclear and defence.

An Exhibition 'Agro-vision 2001' as part of the theme 'Towards food secure India', displayed crops and vegetables, including exotic varieties, and floriculture. Here one could see healthy interaction between the visitors and the staff manning the 'crop cafeteria'. Animals were specially brought to the Congress to highlight the National Animal Genetic Resources that exist in India and the cross-breeding experiments conducted by several government institutions leading to improved stock. In the 'Goat' category, the Central Institute for Research on Goat, Mathura brought goat varieties such as Jamunapari, black Bengal goat and Barbari. The average milk production is about 4–5 kg per day for the Jamunapari variety that is found in UP. The black Bengal goat is a prolific breeder and is found in Bihar and Assam. The Pashmina goats whose natural habitat is the mountain areas of Leh and Ladakh, are known for their 'Pashmina wool'. Their food includes leaves of peepul, neem and datura that are not utilized by other livestock and they can survive for 15–20 days without water. Buffalos were on show by the Central Institute for Research on Buffalo, and the National Dairy Research Institute, Karnal has specially developed cross-breeds 'Karan Fries' and 'Karan Swiss'.

Horses used popularly in marriage 'barats' and riding such as Marwari (Malani breed) were brought by the National Research Centre on Equines, Hissar. A huge French donkey weighing about 330 kg was seen, as were Jaisalmeri and Bikaneri camels. One of the Jaisalmeri camels was intricately decorated with Rajasthani folk motif worked by clipping the wool; it took the craftsman a week for getting it ready for the Congress. The Madras red sheep, Chokla (whose wool is used for carpets) along with Indian cross-bred rabbits were some star presentations. And finally, the Central Avian Research Institute, Izzatnagar had attractions such as Cari-Virat Turkey weighing 15 kg, Kadakanath, an all-black avian, Cari-Aseel Kagar noted for 'cock fights' and several types of quails all of which generated tremendous interest among those who visited the exhibition.

An informal survey conducted among young scientists attending the Congress, revealed the following mixed bag of comments; 'Wasteful' said some and 'Should be held every two years' said some; others felt that it improves self-confidence and promotes interaction, etc. When asked whether they would attend the Congress if no financial support was given, most of them said 'no'.

The 88th session of the Indian Science Congress adopted the vision statement for food, nutrition and environmental security of India. The recommendations

presented by Paroda are for establishing 'Genomic valley' for protecting national interests and conservation, eliminating bureaucratic controls in educational establishments and enhancing agricultural R&D to 2% of agricultural GDP. A 'Livelihood box' would allow developing countries to impose restrictions on imports if they affect livelihood opportunities; included among the goals are precision farming, female literacy, infrastructure development, employment generation for rural poor, post-harvest value addition and nutrition management. Biotechno-

logy could be a powerful tool to alter the nutritional, therapeutic, functional and economic aspects of plant and animal food, and synergy between science, technology, organizations and public policy for enhancing competitiveness in the newly emerging global scenario. The statement set a target date of 2020 to achieve the rainbow revolution.

**Nirupa Sen**, T-115 Transit House, JNU New Campus, New Delhi 110 067, India. e-mail: nirupasen@vsnl.net.

## The Academy meets in Goa\*

Goa played host to the 66th Annual Meeting of the Indian Academy of Sciences, Bangalore, for the first time. As part of the scientific proceedings in 2000, was the topical symposium on 'Climate, Monsoon and India's Water'.

C. V. Raman, in his presidential address at the 1st Annual Meeting of the Academy held at Bombay in 1935 and attended by 65 Fellows, had outlined that among the activities of the Academy should be meetings for discussion of research papers, symposia on special subjects and publication of the proceedings.

Today, the Academy has nearly 800 Fellows and 50 Honorary Fellows. Raman's views in the inaugural address nearly 65 years ago, that the scientific meetings of the Academy, especially the symposia 'are a valuable opportunity for discussing problems of common interest from different points of view', were amply reflected at the vibrant meeting of the Academy in Goa. The open meeting was attended by Fellows, and other scientists, invited teachers from Goa and rest of India and the media.

There were two captivating public lectures. One was the 'show of visual delight, illusion and magic' demonstrated by S. Ranganathan, Indian Institute of Chemical Technology, Hyderabad in his public lecture 'The magic in chemistry'. This attracted a thumping participation from the public, including young students

who were enraptured by his ability, with the help of his assistant, in drawing them to the beauty of chemistry. The magic of nature as seen around us was richly brought out by Madhav Gadgil, Indian Institute of Science, Bangalore in his public lecture 'Butterflies'. This was preceded by the release of the book '*India - A Lifescape, Butterflies of Peninsular India*'. This is the first of a series of fascicles to be published under Project Lifescape - that is part of an initiative by the Indian Academy of Sciences, to enhance the quality of science education. In addition, an exhibition displaying exquisite nature photographs drew accolades. The Academy's initiative to improve the state of science education by attracting bright young minds, found success in spreading this very message, to jam-packed audiences attending the public lectures in Panaji's beautifully constructed Kala Academy.

The three-day meeting had the opening session followed by nine more, which included special lectures, public lectures, lecture presentations by Fellows and Associates and the micro-symposium. N. Kumar (President of the Academy), Raman Research Institute, Bangalore spoke about India being a participant to the 'knowledge revolution' with its 'multi-disciplinary window' in science and technology. Stressing India's important role in prediction and study of the monsoon, a symposium on the same was part of the meeting.

Kumar's Presidential Address on 'Cold atoms' to the distinguished gathering dealt with the how and why of trapping and cooling of atoms towards Bose-

Einstein Condensation (BEC). It has been easier to heat than to cool, borne out by the fact that refrigeration is costlier than heaters. He said that a gas of identical and quantum-mechanically indistinguishable atoms is cold in an absolute sense, if the de Broglie wavelength for its thermal motion exceeds the mean interatomic spacing. BEC phenomenon associated with superfluidity, as seen in  $^4\text{He}$  has been known for a long time. However, more recently the change-over from helium to alkali centric has occurred. This has been made possible by entrapment in a shallow container (mm size) of dilute alkali-atomic gases, using laser beams for cooling down to nanokelvins. This has created a revolution in cooling, with a new chemistry and physics emerging, he added. Novel applications can be found, as in 'atom laser', extending frontiers of physics. Atom lasers could be used to produce nanometric electronic components, shaping a new lithography unimaginable so far. Other possible uses could be in atomic clock, gravity meter and creating acceleration. He suggested that researchers look anew from a laser viewpoint for building optical elements, as the time had come to take initiatives in this field.

A special lecture by P. M. Mathews, University of Madras, Chennai titled 'Glimpses into the earth's interior from observation of objects in space', dealt with how methods of space geodesy, such as very long baseline interferometry (VLBI), using distant reference objects such as quasars, moon and artificial earth satellites could help unravel the mysteries of lunar and solar gravitational forces to

\*A report on the 66th Annual Meeting of the Indian Academy of Sciences organized by the National Institute of Oceanography, and the Goa University at Panaji, during 24-26 November 2000.