

2008 Year of the Planet Earth: thrust needed for Quaternary–Recent geoscience studies

The Quaternary period, spanning 2.6 Ma to 10 Ka, constitutes a fraction of time in the geological timescale of the 4.6 billion year-old earth. And the Quaternary geological formations make a few kilometres to a few hundred metres thick top sedimentary layer on the earth's surface. It is this uppermost veneer of sediments on which mankind depends largely for its survival in terms of food, water, security and environmental sustainability. The global change processes, including climate change, are affecting the physical, chemical and biological conditions of the top layer of the Quaternary–Holocene to Recent sediments. To save the earth, it is necessary that the focus of our earth science studies needs to be oriented towards more immediate issues affecting the planet. It becomes more important for a country like India, with a population of over a billion people interacting and affecting the land, soil, water and air, particularly in the environment of accelerated economic growth and consumption. The geological framework of India is well established and the geological evolution of different geotectonic provinces

is fairly well understood. The whole country has been geologically mapped by the Geological Survey of India. In these attempts, the main emphasis has been to study the hard-rock geological formations, particularly the search for economic minerals. The overburden cover of unconsolidated to partially consolidated sediments of Quaternary–Holocene did not receive adequate attention. Therefore, we have restricted knowledge of the upper layer Quaternary–Recent sediments. Unlike western Europe and USA, there are hardly a few Quaternary geological maps covering India. A similar situation exists for the Quaternary–Holocene period, about which we have limited knowledge of the events and the processes affecting the earth's surface in the past and recent times. In the 2008 Year of the Planet Earth, thrust for the Quaternary–Recent geoscientific studies in the following broad areas is suggested: (a) Quaternary geological maps. (b) Neotectonics and active tectonics studies for natural hazards assessment, and to evolve prevention and mitigation strategies. (c) High-resolution palaeoclimate

studies for identifying past climate events during Quaternary–Recent. (d) Land use and impact factor of economic development. (e) Real-time monitoring of earth system processes including (i) hill slope stability, (ii) weathering and erosion rates, (iii) aggradation rates of sediments in rivers, lakes, and man-made reservoirs, (iv) seismicity and crustal movements, (v) mass balance of glaciers for global warming, (vi) surface and groundwater regimes, (vii) environmental degradation processes affecting the earth's surface due to human intervention, (viii) interdisciplinary studies of earth's surface processes, ecological systems and human activities, (ix) Himalaya–Indo-Gangetic plain interaction, (x) land–ocean interaction in the western and eastern coasts, and (xii) other related aspects.

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Prospects of apomixis for fixation of cotton hybrids

India is unique in the world with large-scale cultivation of cotton hybrids which are widely adaptable, more productive and possess uniform fibre quality compared to straight varieties. In March 2002, the Government of India approved the first *Bacillus thuringiensis* (Bt) cotton in three hybrids, viz. MECH 12, MECH 162 and MECH 184 for commercial cultivation. A series of Bt hybrids were released thereafter and the total number of Bt hybrids presently approved has reached 280, covering an area of 58 lakh ha. All private firms have exploited the advantages of high yield and less requirement of pesticide sprays in Bt cotton to develop superior cotton hybrids. The foremost issue in the cultivation of Bt hybrids is its high cost, which puts poor and marginal farmers of rainfed areas at risk.

The risk is added with the need to replace seeds every year, since hybrids segregate in the next generation. The recent approval of Bikaneri Nerma Bt developed by the public sector and its utilization in the conversion of elite lines for further development of Bt hybrids/varieties may give little solace to the farmers in terms of its cost. But the additional time and labour for maintenance of parental lines with utmost purity and performing grow-out tests in Bt hybrids will be cumbersome for seed replacement of Bt hybrids even in the public sector. Apomixis is a phenomenon capable of solving the problem which has attracted considerable practical interest of breeders and biotechnologists in the recent past. Apomixis is a phenomenon where there is seed formation from the maternal tissues

of the ovule, avoiding the process of meiosis and fertilization leading to embryo development, and is mainly found in polyploid species. This mode of reproduction occurs in about 35 families of angiosperms including Asteraceae, Rosaceae, Poaceae, Orchidaceae and Liliaceae, in which ornamental species can also be found¹. However, it appears that polyploidy is not necessary for the expression of above trait and can be found even in aneuploids^{2,3}. In cotton, apomixis was first observed at the Marathwada Agricultural University, Nanded, in a tri-species cross involving *Gossypium arboreum*, *G. hirsutum* and *G. barbadense*. The progenies derived from this cross had abnormal chromosome number and showed apomictic characteristics. Further studies using various methods such

as emasculation and selfing as well as removal of style and stigma of the parent plant will assist in the confirmation of apomictic phenomena in cotton. Cytological and embryological studies of these lines would strengthen the confirmation of apomixis. Presently, efforts are being focused on genetic and breeding strategies of apomixis in various plant species, combined with molecular methods to analyse the apomictic and sexual mode of reproduction⁴. Unravelling molecular markers associated with the trait and identification of key regulatory genes underlying the phenomenon will open up new avenues for transfer of the trait to any elite genotype/hybrid, so that they

behave like straight varieties and can be propagated asexually^{5,6}. This will allow small and marginal farmers to propagate their own seeds. As a result, commercial production will be simplified with a subsequent decrease in cost.

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MEETINGS/SYMPOSIA/SEMINARS

Workshop on Assays in Toxicology (WAT 2009) – Biomarkers in Toxicology and Disease

Date: 2–13 February 2009

Place: Chennai

A two-week, Hands-on-Training-cum-Workshop will cover a wide range of assays from cytogenetics to molecular biology. Being truly hands-on in nature, the number of participants will be limited to 25 (within the country and abroad) and preferably sponsored by institutions that aim at establishing these techniques for long-time use at their respective centres. Faculty will consist of expert scientists from India and abroad.

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National Symposium on ‘Non-Chemical Insect Pest Management

Date: 5–6 February 2009

Place: Chennai

Topics include: (1) Plant-based pesticides – techniques, preparation and application, (2) Microbial pesticides, (3) Biological control – techniques for mass rearing of natural enemies and their biocontrol potential, (4) Cultural control measures, and (5) Field efficacy and economics of pheromones, traps and attractants.

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Open source drug discovery launched to combat infectious diseases

The scourge of infectious diseases like tuberculosis (TB), malaria, etc. generally afflicts poor people in the developing world, with a loss of millions of lives every year, which could otherwise be saved. Due to long gestation period, heavy R&D costs, low success rate and low returns from the afflicted poor patients, big pharmaceutical companies do not see any lucrative business in developing drugs for such diseases.

To combat these problems and provide affordable healthcare (low-cost drugs) to the poor, an innovative 'Open Source Drug Discovery' (OSDD) programme was recently launched by the Council of Scientific and Industrial Research (CSIR) in New Delhi, according to a press release posted at the official website of the Department of Science and Technology, Government of India.

OSDD is based on three fundamental principles of collaboration, sharing and discovering. In fact, it is a pathbreaking

research programme of the people, by the people, for the people.

OSDD – a CSIR led consortium with global partnership – promises to offer a viable alternate model of drug discovery for infectious diseases by allowing open access of resources and providing incentives to contribute to this cooperative effort. For this purpose, CSIR has set up a web portal (<http://www.osdd.net>), which will act as a data resource and a discussion platform for the concerned participants to share their ideas.

Anyone can contribute or modify the contents on this website in a collaborative mode, just like the Wikipedia. However, these ideas and suggestions will be peer-reviewed and acknowledged accordingly. A large number of researchers will be united through the internet to exploit their inventive spirit in a collaborative mode for drug discovery.

A number of CSIR laboratories, non-CSIR institutes, Indian universities and

private companies are participating in this largest ever collaborative drug discovery programme. In addition, Global Research Alliance is also supporting OSDD. India will spend Rs 500 crores for OSDD and more help is expected to come from international agencies and philanthropists.

Researchers will explore large chemical databases using bioinformatics to identify potential drugs *in silico*, which will later be tested at CSIR-sponsored laboratories. A core committee of OSDD experts will make potential drugs generic as soon as they are discovered, so that pharmaceutical companies can manufacture these and sell them at affordable prices.

1. http://dst.gov.in/whats_new/press-release08/csir-drug-discovery.htm
2. <http://www.osdd.net>

Abhay S. D. Rajput

India bags two International Academy of Astronautics Awards 2008

Two prestigious awards of the International Academy of Astronautics (IAA) for the year 2008 came to India which were presented on 28 September 2008 during the Academy Day Function at Glasgow, Scotland, UK organized as a part of the International Astronautical Congress (IAC) 2008.

The Team Achievement Award was presented to two teams from Indian Space Research Organisation (ISRO) in-

cluding the PSLV-C7 team that launched CARTOSAT-2 and the team that deployed and recovered Space capsule Recovery Experiment (SRE-1; http://www.isro.org/pressrelease/Sep30_2008_251.htm).

Touching Lives a book by S. K. Das was honoured with Luigi Napolitano Book Award of IAA. It is given to recognize excellence in recent publications in any field related to space by any non-member of the Academy. *Touching Lives*

is an account of people whose lives have been transformed by ISRO's space technology (http://www.isro.org/pressrelease/Sep30_2008_253.htm). It journeys through some space technology aided revolutions sweeping the country like telemedicine, EDUSAT distance education, warning system for fishermen, etc.

Abhay S. D. Rajput

CSIR Award for S&T Innovations for Rural Development 2008

The winners of the CSIR Award for S&T Innovations for Rural Development (CAIRD) 2008 were announced recently on the occasion of the 66th CSIR Foundation day.

According to a Ministry of S&T, Govt of India press release, the award goes jointly to Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow for 'Biovillage Strategy for Agri-business of Medicinal and Aromatic Plants' and

Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar for 'Innovations in the area of salt for rural development'. Both the institutes have contributed to the upliftment of the livelihood of rural people through their sustainable efforts and innovations.

The award carrying a cash prize of Rs 10 lakh, a citation and a shield was instituted by CSIR in 2006, 'to recognize and honour S&T innovations that have

helped transform the lives of rural people'. For further details see: http://dst.gov.in/whats_new/press-release08/csir-rural-development-2008.htm

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