

ther stated that 'leaving the work of the institutions in the hands of older scientists may reduce the overall viability of Indian research'.

In any organization, if old age has hindered or adversely affected the innovativeness and or creativity, then to uphold discipline among the scientific community, the policy of promotion or recruitment has to be suitably amended. Further, the performance and contribu-

tions of scientists, irrespective of their positions are to be rigidly and periodically reviewed.

However, in this regard, it is imperative to remind ourselves that the *present young* will be the *future old*. A scientist whether young or old should be in quest of truth and knowledge. In various disciplines, many of the theories and hypotheses, put forth by the earlier scientists have even to this day remained as the basis for any

future studies. Let us salute the profound knowledge and insight of the old guardians of science!

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## NEWS

### Uncommon opportunities for a food secure world

There can be nothing more urgent than ensuring a food-and-nutrition-secure world where all of humanity will have enough to eat and be free from malnutrition now and in the future. This, however, is a formidable task. Attempts made in the past have not yielded the desired results. The situation continues to be one of deep concern. It is to tackle this problem that the FAO, which has been continuously addressing the question of feeding the world for the past more than 50 years, is convening the world food summit, a high level meeting of Heads of State and Heads of Government, in Rome during 13-17 November 1996.

Many of our resources - aquifers and the ozone cover, for example - are being depleted unsustainably. The natural-biological resource base has steadily deteriorated. Loss of biodiversity, soil erosion and desertification have gradually reduced the productive capacity of agricultural land. In some cases, this process has become irreversible, pointed out Elizabeth Dowdeswell, Executive Director, UNEP. 'The earth's capacity to produce enough food to satisfy our expanding demand is now emerging as the overriding environmental issue as the world approaches the 21st century', says Lester Brown of the World Watch Institute. And 'food security' is just one, albeit the major, component in the ongoing population-resource debate. There are other factors such as unprecedented demand for energy and other resources, quality of life, technological options, political freedoms, economic arrangements,

notions of justice and equity, and living in peace with other creatures with whom we share the planet.

Thus the tasks confronting humanity today are mammoth and complex and call for concerted effort of people from different streams of life. Surely, science has to play a crucial and central role if the desired goals are to be achieved. It is with this conviction that several Science Academies of the world decided to pool their collective wisdom to address the major issues of food and nutrition security and prepare a work agenda to be placed before the November Summit of political leaders.

The initiative came from the National Academy of Agricultural Sciences of India, Accademia Nazionale Delle Scienze, Rome, and the Third World Academy of Sciences, Trieste, to organize a four-day Science Academies Summit to reflect as scientists on the theme of 'sustainable food security' and to delineate the role of science and scientists in ensuring a balanced food basket for an ever-increasing population. This meeting was supported by Food and Agriculture Organization (FAO), Ministry of Foreign Affairs, Government of Italy, United Nations Development Programme (UNDP), and the Encyclopaedia of Life Support Systems (EOLSS).

At the Science Summit convened at the M.S. Swaminathan Research Foundation, Madras, during July 8-11, 1996, there were representatives of fifteen Science Academies including the Caribbean and Chinese Academies as well as the

Academies of Kenya, Uganda, Hungary, Lithuania and Pakistan, and international organizations including FAO, UNDP, UNEP, UNESCO, and CGIAR. The meeting was addressed by, among others, Gaetano Zucconi, Italian Ambassador to India, Ministers of the Government of India Chaturanan Mishra and Yogendra Alagh, elder statesman C. Subramaniam, and Tamil Nadu's Minister for Agriculture Veerapandi Arumugam.

The summit commenced with welcome addresses delivered by M. S. Swaminathan, President of the National Academy of Agricultural Sciences of India, G. T. Scarascia Mugnozza, President of the National Academy of Sciences of Italy, Johanna Dobreiner of the Third World Academy of Sciences, Peter Rosenegger, FAO Representative for India and Bhutan, and Hans-C. von Sponeck, Resident Representative of UNDP in India.

Y. K. Alagh, Minister for Planning and Science and Technology, reiterated the need for comprehensive measures that would ensure long term sustainability and said short-run crisis management would only lead to serious adverse consequences. Recognizing the key role of information dissemination, he emphasized the need to adapt the extension system for it to be able to convey the tremendous technological developments that are taking place now. He would also like to have in place a good system of patenting indigenous innovations that would make them freely available to the local people. For his part, the Union Minister for Agriculture,



Mishra, pleased the scientists assembled telling them that governments should invest a high percentage of their GDP on agricultural research. For example, he would like India to invest at least 1.0% as against 0.3% of GDP being spent now. Another suggestion he made was to have a system of social audit of research institutions.

While the Minister's ideas on government support are surely welcome, Elizabeth Dowdeswell felt that we must not depend upon the government for everything and we should also win the support of the private sector. There can be no talk of sustainability until the disparities in patterns of economic growth and consumption have narrowed. Women, in particular, have been marginalized by resettlement schemes and land tenure policies that emphasize male households. There should be a gender assessment study of each project going on farm, said Dowdeswell.

Food security is not a static concept and it changes with new life styles and new human habits. So do the tools to achieve it, pointed out Adnan Badran, Deputy Director General, UNESCO. Food security, thanks to the ongoing revolution in genetic engineering, will soon be determined on the lab-bench by interdisciplinary programmes yielding new strains resistant to diseases and insects and high protein diets from organic compounds produced biologically from algae, fungi, bacteria or synthetic hydrocarbons. Badran drew attention to the tremendous North-South disparities in the number of scientists and in the expenditure on Research and Development. He highlighted the different ways scientific research can help achieve food security, such as molecular biological research on agronomic, horticultural plants and animal husbandry to increase the yield, and R&D in genetic engineering for (a) high yield strains, (b) new crops, (c) resistant varieties to disease and insects, (d) dwarf varieties for intensive crop production, (e) post harvest longevity, (f) augmenting quality to consumer taste, and (g) adaptability to stress physiology.

Iba Kone strongly felt that the use or transformation of DNA strains for any purpose other than the benefit of humanity should be outlawed by the International Court of Justice at The Hague. Ismail Serageldin, Chairman, CGIAR, was concerned that the tremendous North-South

knowledge gap could lead to a new class of scientific apartheid.

Johanna Dobereiner emphasized the urgent need to establish regional centres of excellence dedicated to high quality training and research in critical fields such as food crops, agroforestry, agronomy, agrometeorology, soil and water management, and pest control in ecologically complex and fragile regions, and in the fields of molecular biology, genetic engineering, biotechnology and informatics. In her view, the success of India's Green Revolution has clearly established agricultural research as a major contributing factor in enhancing food security. She pleaded for greater North-South cooperation in research as well as fruitful industry-research-farmer interactions. It is important, she said, to develop fuel from bio-mass as has been done in Brazil and to select appropriate high-yielding varieties that would not need high doses of fertilizers.

R. S. Paroda, Secretary, Department of Agricultural Research and Education, Government of India, highlighted the tasks involved in Eco-regional Research and Development, such as identifying and prioritizing research issues common to different ecoregions and developing mechanisms for collaborative programmes involving National and International Agricultural Research Systems, FAO, UNDP, donors and NGOs as well as monitoring the improvements in the ecoregion according to predetermined sustainability criteria. On the management issue, he emphasized the need for research on (i) the conservation and management of eco-systems that include multi-crop integrated farming systems in a programme mode, (ii) the management of production systems, and (iii) factors affecting farmers' incentives and adoption of improved technologies.

Jyoti Parekh, from Indira Gandhi Institute of Development Research, spoke on the importance of developing environmental auditing approaches and constructing environmental indicators. She suggested that environmentally sound farm management practices should be rewarded.

B. K. Sinha opined that food technology should play a greater role in popularizing coarse grains and root and tuber crops. Clement Sankat also thought that there is a need for us to shift our focus from cereal grains, rice, wheat and maize to

less exploited crops like roots and tubers, pulses (pigeon pea), oilseeds, fruits (Sapodilla, Cassava and Carambola), herbs and spices (Coriander). Self-sufficiency of individual countries or by a group of nations in a region with a consideration of climatic conditions may provide a stronger basis for food security of developing countries.

Obaidullah Khan of FAO could not agree any less with Y. K. Alagh in the need for winning recognition for the concept of community knowledge which is currently being threatened by the IPR regime. An underlying hard political issue of rural societies is the participatory control of and access to natural resources by those who are dependent on those resources. Another area of concern is the inadequate use made of the distinctive knowledge of women as far as food security and biodiversity are concerned.

Dominic Makawiti of the Kenyan National Academy of Sciences would like traditional foods made of highly nutritious and drought-resistant millet, sorghum and cassava to be revived and popularized through education. Hotels and restaurants, he said, should present traditional foods in a modern way that would make them more palatable. He would also like the public to be made guardians of the local environment.

An overview of what modern science can do to the improvement of post production systems was provided by Joseph Hulse. The possibility of using mathematical models and computer technologies in determining efficient means of placing and integrating all the components essential to safe and efficient preservation, transformation, distribution and marketing from rural and maritime producers and harvesters to urban markets and consumers is indeed attractive. He would like the National Agricultural Research Systems to be strengthened and the CGIAR Centres to pursue a policy of subcontracting many of their present responsibilities and activities to NARS and regional research networks.

While most of the Science Summit was concerned about what science and technology could do, Amir Muhammed, President, Pakistan Academy of Sciences, went beyond science and technology and emphasized the need to bring in management techniques to agriculture, to involve social scientists and to give highest priority to land reforms, streamlining land records, land consolidation and land tenure.



The Science Summit brought into sharp focus the urgent need to address the issue of food security with all the knowledge and skills at our command. The meeting threw up several cases from actual successful experiences worldwide and emphasized the need to blend the traditional agricultural practices with what modern biotechnology has to offer. What we need, probably, is a people-oriented

Super Green Revolution that can ensure all the benefits of the Green Revolution on a global scale minus its environmentally harmful effects, and at the same time make economic sense. We need a research agenda that integrates sustainable development, food security and the environmental concerns.

The mood is one of cautious optimism. While the tasks facing us look daunting,

it is felt that one can win the battle with an appropriate blend of scientific and technological inputs and conducive public policies.

**Ruchi Bhandari and Subbiah Arunachalam**, M.S. Swaminathan Research Foundation, Madras 600 113, India.

## Madras Declaration of the Science Academies Summit

*The text of the declaration adopted at the Science Academies Summit convened at the M.S. Swaminathan Research Foundation, Madras, during 8-11 July 1996, is reproduced below.*

We, the participants of the Science Academies Summit, call upon the world leaders assembling at the World Food Summit convened by FAO in Rome in November 1996 to adopt this agenda as a means of harnessing science and technology for the transformation of agriculture into a primary instrument of a global *Evergreen Revolution*. Based on the principles of ecology, social equity, energy efficiency, employment generation and economic viability, this revolution will provide the technical foundation for the universal eradication of hunger and achievement of a food and nutrition secure world for all. At the same time, we wish to emphasize the urgent need for adaptation, particularly by developing countries, of population policies which can ensure that children are born for happiness and not for mere existence.

### A new revolution in agriculture

In the over 50 years since FAO took up the challenge of 'food for all', never before has science offered greater opportunity to achieve this goal for even the poorest of the poor. Scale-neutral innovations including those emerging from the fields of biotechnology and information technology, as well as the holistic management systems of soil health care, conjunctive water use, integrated pest management and integrated intensive farming systems represent only a few of the new opportunities to reach the nearly 800 million people lacking adequate nutrition.

Tapping this unprecedented potential will depend upon strengthening the capacity of national agricultural research and development systems to respond to

these new challenges with creativity. Therefore, we urge world leaders to reverse the global trend of disinvestment in agricultural research and development, convinced that such short-sighted policy can but only have tragic results. At the same time, limited resources make prioritization of research initiatives essential, and it is intended that this agenda assist political leaders in that task.

Meeting the challenge of increasing food availability now and in the future demands equal focus on production systems and on the larger issues of access to food. Therefore, science must work in partnership with farmers to create a new agriculture. An Evergreen Revolution must bridge the gap between the past's gains in production and the persistent need for reliable access to food by all. This will require a number of innovative approaches, including:

- Transformation of the most marginalized farmers of the world into agents of poverty alleviation and environmental management through the blending of traditional and frontier technologies in socially equitable, economically viable and environmentally sustainable *ecotechnologies*.
- Production of more food from a diminishing resource base, requiring new agricultural technologies and management systems providing *increased productivity* per unit of land, water, energy, labour and investment. Part of this will involve focussing research on neglected crops such as minor millets, grain legumes and tubers which can perform in times of environmental stress and in neglected areas such as arid and semi-arid coastal and mountain areas.

- A *systems approach* marshalling the combined and coordinated efforts of physical scientists and agricultural researchers, as well as systems analysts, mathematicians and social scientists. While agricultural production will remain the foundation of food and nutrition security, the larger scientific framework must integrate post-harvest technology, distribution systems and rural development, as well as economic and social empowerment of the poor, especially women. This holistic approach must also be taken in restructuring administrative systems, leading to a high degree of professionalism of such services.

Eliminating hunger among the poor of all nations will depend upon tapping the new opportunities offered in these *unconventional approaches*. Such *uncommon opportunities* are rooted in a new and broader conception of food and nutrition security which integrates multiple physical, social, economic and environmental dimensions.

### National policies for sustainable food and nutrition security should ensure

- that every individual has the *physical, economic, social and environmental access* to balanced diet that includes the necessary macro- and micro-nutrients, safe drinking water, sanitation, environmental hygiene, primary health care and education so as to lead a healthy and productive life.
- that food originates from efficient and *environmentally benign production technologies* that conserve and enhance the natural resource base of crops, animal