

Science and Sustainable Food Security. Selected Papers of M. S. Swaminathan. M. S. Swaminathan, IISc Centenary Lecture Series. Tjan Kwang Wei (ed.). World Scientific Publishing Co. Pte. Ltd. 2010. Vol. 3. 436 pp. Price: US\$ 98/£74.

This book grew out of the IISc Centenary Lecture Series that were delivered by M. S. Swaminathan. It contains a lead article entitled 'From green to an ever-green revolution'. This is followed by a selection of 28 articles that have been organized under three broad sections. The topic of the book and the selection is indeed of great interest since it throws light on one of the most fascinating chapters of development in the post-independence period of India. The lead article is excellent and panoramic in its sweep, taking note of the developments from the 19th century onwards. He leads the reader from 1905 when the Indian Agricultural Research Institute (IARI) was started at Pusa in Bihar to the early development of selected wheat and paddy varieties and the Bengal famine in the early 1940s.

He then narrates how agricultural production and productivity was viewed from 1947 onwards, starting with the famous observation of Jawaharlal Nehru '... everything else can wait but not agriculture'. While the Nehru era till 1964 was marked by infrastructure development for scientific agriculture, such as irrigation projects, fertilizer factories, agricultural universities and research institutes and extension agencies, he points out how food production could not keep pace with the population increase which led to the precarious dependence on American wheat imports reducing us to

what he calls as a 'ship to mouth' existence.

He then takes the reader through the initial key steps leading to the green revolution making note of all the seminal developments. The initial steps were the hybridization programmes to transfer genes from *japonica* to *indica* rice varieties. He then notes how the real breakthrough came after the introduction of the semidwarf *indica* varieties. He traces his efforts to get grains with the dwarfing gene through Orville A. Vogel of the Washington State University, USA who then put him in touch with Norman Borlaug who was developing semidwarf varieties which may be more suited for the Indian context. This was followed by Borlaug's visit to India in March 1963 following which he sent seed material of four semidwarf varieties. This led to a five-year plan during the 1963–68 period preparing a road map for the 'wheat revolution'.

The narrative of this chapter is engrossing and reflects the excitement and spirit of that era. It is striking to see how the author paid keen attention to the social and economic aspects of the technology to be developed and was not focused narrowly on only the scientific aspects. He describes how he had stipulated in his proposal for a National Demonstration Programme that '... the demonstrations should be laid in the fields of small farmers since yield results from demonstrations in rich farmers' fields will be attributed to affluence and not to technology'. As one might expect, there were objections to this approach from the ministry since according to them this demonstration should be laid out in the fields of 'progressive farmers' which the author calls as a euphemism for resource-rich farmers. Fortunately for him, C. Subramanian who had joined then as Minister for Food and Agriculture overruled this objection – this seems to have marked the beginning of a long and fruitful partnership which was to have great significance for the development of Indian agriculture.

It is also quite absorbing to see that as early as 1968, the author had foreseen the possible risks arising out of indiscriminate use of chemicals, unscientific tapping of groundwater and the possible erosion of biodiversity. A summary of the author's address to the Agricultural Science Section of the Indian Science Congress held at Varanasi in January

1968 is prophetic in its foresight and reproduced here.

'Exploitive agriculture offers great dangers if carried out with only an immediate profit or production motive. The emerging exploitive farming community in India should become aware of this. Intensive cultivation of land without conservation of soil fertility and soil structure would lead, ultimately, to the springing up of deserts. Irrigation without arrangements for drainage would result in soils getting alkaline or saline. Indiscriminate use of pesticides, fungicides and herbicides could cause adverse changes in biological balance as well as lead to an increase in the incidence of cancer and other diseases, through the toxic residues present in the grains or other edible parts. Unscientific tapping of underground water will lead to the rapid exhaustion of this wonderful capital resource left to us through ages of natural farming. The rapid replacement of numerous locally adapted varieties with one or two high yielding strains in large contiguous areas would result in the spread of serious diseases capable of wiping out entire crops, as happened prior to the Irish potato famine of 1854 and the Bengal rice famine in 1942. Therefore the initiation of exploitive agriculture without a proper understanding of the various consequences of every one of the changes introduced into traditional agriculture, and without first building up a proper scientific and training base to sustain it, may only lead us, in the long run, into an era of agricultural disaster rather than one of agricultural prosperity.'

The later part of the chapter takes note of various developments in the last 40 years and towards the end provides an overview about the state of Indian agriculture today with his suggestions for the way ahead. Some of his key recommendations coming out of rich experience and deep reflection are worthy of quick action such as the widening of the food security basket to include crops of dry farming areas, the inclusion of nutritious cereals and pulses in the public distribution system (PDS), reflections about how one can defend the gains in the heartland of the green revolution, the restructuring of the agricultural education system, etc.

Towards the concluding portion of the chapter, he sums up with a statement, 'We should look upon agriculture not just as a food-producing machine for the urban population, but as the major source of skilled and remunerative employment and the backbone of the rural livelihood system.'

Ideally, the book should have been structured as the lead presentation of the author that is followed by the selection of papers linked organically to it. However, it falls well short of being this due to several problems in the way the book is structured including the organization and selection of papers. A few of these are mentioned here.

- The lead article makes a mention of several key developments such as the results of his first experiments with the semidwarf varieties to study the genotype–environment interaction. However, the 1965 paper, which has been referred to in the lead presentation does not form part of the selected papers.
- Similarly, it is disappointing to see that several other fascinating developments referred to in the lead paper such as his proposal for the National Demonstration Programme in Small Farmers fields published in 1966 and his paper on the evolution and significance of seed villages published in 1968, etc. have not been selected.
- The papers that have been selected have been organized in three main sections, viz. Food security and economic development, Science and food security, and Food security and ecological balance. The articles in all these sections are listed in an order that is neither chronological nor reverse chronological and in the absence of a pattern, the reader is left searching for some references.
- It is also puzzling to see that the book includes an article by the author on Consanguineous marriages in Kerala. It is not clear as to why this finds a place in a collection of papers related to sustainable food security.

The book however presents a splendid collection and a panorama spanning a period of over 50 years. It includes publications from 1954 when the author was still a very young researcher right down to the year 2009. The collection ranges from highly technical papers from jour-

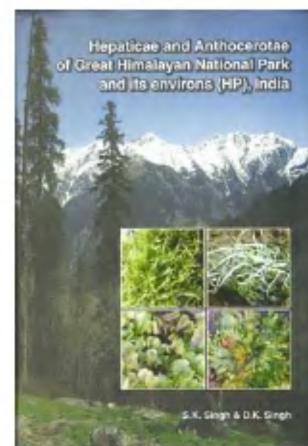
nals such as *Nature*, *Science* and *Lancet* to lectures that were delivered on various occasions, chapters that form part of the books, addresses the various scientific bodies and newspaper articles aimed at a very general reader on broad themes such as climate change.

It is also interesting to see that the author had never ever conceived the green revolution as a quick technological fix or an approach that is relevant for all time or throughout India. He had advocated and recognized the need for restricting indiscriminate use of chemicals, dangers of unscientific tapping of groundwater, problems of biodiversity erosion and the need for a long-term strategy that respects the cycles of nature and emphasizes the need for community-based management of biodiversity and resources very early on and much before these terms became fashionable catchwords.

For an Indian who grew up in the 1960s (when this reviewer was a school-boy in New Delhi), a vivid image is one of perennial food shortages and a precarious political situation due to dependence on imports. The flavour of the era was epitomized by R. K. Laxman's cartoon. It depicts a minister who looks out of his window and remarks to his aide '... good, good the monsoons are on time. Once again this year, we can ask the Americans to mind their own business'. Thanks to the green revolution – that era is only a dim memory. Nevertheless, it is a matter of concern that even today a large section of the scientific community tends to see the progress in the agriculture sector as a matter of more and more technological fixes. It is heartening in this context to remind ourselves of M. S. Swaminathan's statement, 'The green revolution of the 1960s provided a breathing spell for achieving an adjustment between population growth and food production'. This book contains a fascinating narrative of how the era evolved and is rich with various ideas and suggestions about the way forward.

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Hepaticae and Anthocerotae of Great Himalayan National Park and its Environs (H.P.), India. S. K. Singh and D. K. Singh. Botanical Survey of India, CGO Complex, 3rd MSO Building, Block F (5th Floor), DF Block, Sector 1, Salt Lake City, Kolkata 700 064. 2009. x + 465 pp. Price: Rs 1300/US\$ 104.

Several monographic studies have been carried out on Hepaticae and Anthocerotae of India but the protected areas of the country being the hotspots of biodiversity and conservation remained neglected so far with respect to lower plants. The book under review is the first attempt to evaluate the diversity among the Hepaticae and Anthocerotae of the Great Himalayan National Park in a comprehensive manner. It marks the beginning of a welcome trend not only in the field of bryophytes but also in the vast area of biodiversity of lower plants as a whole. It would certainly inspire younger workers to make similar attempts to assess the bryo-diversity of other national parks and 'biosphere reserves' of the country. It would immensely help us monitor *in situ* conservation of bryo-diversity, an important component of our ecosystem.

The book begins with a Foreword followed by Preface, and a brief introductory note highlighting the need for such contributions in our understanding of diversity and distribution of liverworts and hornworts in the Great Himalayan National Park. An overview of its remarkable features includes some of the more interesting information regarding the topography, geology and soil, climate and general vegetation of the study area. It also includes the details of the materials studied and methods employed besides analysis of the taxa occurring in the area, their distributional relationship,