

Preface

The special section on Sustainable Food and Nutrition Security is in honour of *Padmavibushan M. S. Swaminathan*, on the occasion of his 90th birthday on 7 August 2015.

One of the greatest achievements of India in its post-independent era is its attaining self-sufficiency in food production in the 1960s through the Swaminathan–Borlaug Green Revolution. While it was the need to provide ‘breathing space’ and put India’s annual cereal grains production rate ahead of its population growth rate, the fact that monoculture-based, chemically intensified agriculture would not sustain productivity over long periods of time was first pointed out by Swaminathan himself. He, therefore, developed the concept of ‘evergreen revolution’ and designed it to fight the famines of food and rural livelihoods without eroding the ecological production base. The evergreen revolution functions in harmony with nature. Biovillages and modern ICT-based village knowledge centres are designed to provide skill and knowledge empowerment of the rural communities to adopt ecoagriculture and one or more of the ecoenterprises of on-farm and non-farm livelihoods. Historically, agriculture was considered as a destroyer of biodiversity since forestland was usurped for farm land. However, Swaminathan’s evergreen revolution provides avenues for ecoagriculture and even farming with landscape. Hence, the ‘evergreen revolution’ concept is the solution, according to E. O. Wilson of Harvard University who pointed out that it could feed the burgeoning human population, and yet save the rest of life as well. Income-generating rural on-farm, non-farm and marine-based livelihoods are the ecoenterprises.

The contributors to the special section combine vast expertise with close association at one time or another with him. The papers cover a wide dimension of Swaminathan as a conservationist, geneticist, leader, a scientist who was not an ivory tower Professor.

Kenneth M. Quinn, a distinguished member of the US Foreign Service who has served as Ambassador in many countries including Cambodia, has been the President of the World Food Prize Foundation since 2000. The World Food Prize is regarded as equivalent of the Nobel Prize in the field of food and agriculture. In his paper ‘M. S. Swaminathan – Scientist, hunger fighter, World Food Prize Laureate’, he describes Swaminathan as the central figure in the history of the Green Revolution and of the World Food Prize (page 417).

Louise O. Fresco is currently the President of the Agriculture University and Research Centre of Wageningen, the Netherlands. She is an eminent authority in the fields of agricultural research, extension and development and has served as Assistant Director General of FAO. In her paper entitled ‘The new green revolution: bridging the

gap between science and society’ Fresco notes that Swaminathan combines scientific excellence with social issues and has, thus, put himself in the tradition of the great agricultural researchers such as Von Liebig, Vavilov, De Vries, Haber and Norman Borlaug, who all have defeated the spectre of Malthus (page 430). She also expresses her concern over the challenge of feeding nine or ten billion people by 2050 with sufficient and nutritious food and also producing enough raw materials for developing the bio-based economy. She deplors the growing distrust in science which might lead to paralysis in agricultural development. In this regard, she appreciates Swaminathan’s role in bridging the gap between the sciences and society and to engage society in the development of science to meet the challenges of tomorrow.

Rudy Rabbinge is University Professor Emeritus in Sustainable Development and Food Security at Wageningen University, Netherlands. He has served as Senator of the Netherlands Senate. He is one of the world leaders of climate smart agriculture which will help to insulate crop production from the adverse impact of climate change. In his paper entitled ‘M. S. Swaminathan: his contributions to science and public policy’, Rabbinge observes that the role of Swaminathan in science and public policy for over sixty five years has no parallel (page 439). He describes that Swaminathan’s incisive vision on the role of science to serve societal aims is widely accepted and his concept of Evergreen Revolution is spreading across many countries and continents. In particular, he mentions that Swaminathan foresaw very early the negative consequences of approaches where only one objective, for example short term productivity of rice, is promoted that might lead to long term risks and dangers such as loss of stability and productivity due to erosion of horizontal resistance and overuse of inputs with dramatic environmental effects. He applauds Swaminathan for creating harmony between nature and agriculture as the President of International Union for Conservation of Nature (IUCN). Swaminathan, the only biologist so far elected as the President of Pugwash Conferences on Science and World Affairs (2002–2007), played a significant role to enlarge the concept of human security by adding hunger and pandemics like HIV/AIDS as threats equal as nuclear war. Pugwash now includes environmental and food security along with nuclear security.

Glenn Denning is at the School of International and Public Affairs (SIPA) and Senior Policy Advisor, The Earth Institute, New York. Denning in his paper entitled ‘Fostering international collaboration for food security and sustainable development: a personal perspective of M. S. Swaminathan’s vision, impact and legacy for humanity’ describes the monumental contributions of Swaminathan in transforming the once conflict-affected

Cambodia into a nation of self sufficiency in rice and an exporter of rice even (**page 447**). He also refers to Swaminathan's role in the United Nations Hunger Task Force to change the global thinking about hunger and food security by going beyond productivity improvement to include nutrition, social safety nets, natural resource management, and an enabling policy environment. Both cases illustrate the power of international collaboration and a commitment to inclusive and sustainable development.

Prakash Shetty is Professor at the University Southampton Medical School, UK. In his paper entitled 'From food security to food and nutrition security: role of agriculture and farming systems for nutrition', he describes Swaminathan's role in bringing about a paradigm shift in policy formulation from focusing on food security at the aggregate level to nutrition security at the level of each child and adult (**page 456**). The integration of nutrition security with food security is a very major landmark in addressing hunger. He refers to the recent concept of 'farming system for nutrition (FSN)' evolved by Swaminathan in developing agricultural remedies for nutritional maladies.

Ajaya Parida and Suja George of M.S. Swaminathan Research Foundation in their review paper 'Sustaining and enhancing crop productivity in an era of climate change' discuss broadly the molecular mechanisms of plant abiotic stress tolerance and the recent advances in biotechnological research towards improving the genetic shielding of crops against abiotic stresses (**page 462**).

N. Anil Kumar, V. Arivudai Nambi, M. Geetha Rani, E. D. Israel Oliver King, Susanta Sekar Chaudhury and Smita Mishra of M.S. Swaminathan Research Foundation in their paper entitled 'Community agro biodiversity conservation continuum: an integrated approach to achieve food and nutrition security' describe Swaminathan's idea of integrating conservation, cultivation, consumption and commercialization (4Cs) as a means to ensure ecological and food security (**page 474**). Loss of locally adapted varieties is largely because of preferential cultivation and consumption of high-yielding varieties. The authors describe how the 4Cs-approach is playing an important role in the conservation of locally adapted landraces and

indigenous varieties in Kolli Hills in Tamil Nadu, Jey-pore in Odisha and Wayanad in Kerala.

P. C. Kesavan of M.S. Swaminathan Research Foundation in his paper entitled 'Shaping science as the prime mover of sustainable agriculture for food and nutrition security in an era of environmental degradation and climate change' describes how the commodity-centric exploitative agriculture (green revolution) was the need of the hour in the 1960s to achieve self sufficiency in food production despite its adverse effects on environment and how its transformation into a 'systems approach' based evergreen revolution by Swaminathan has ensured sustainability in all its three dimensions of ecology, economics and equity in gender and social terms (**page 488**). The evergreen revolution relies more on 'biological softwares' than chemical inputs. It also harnesses ecotechnologies for sustainable management of resources in creation of on-farm and non-farm livelihoods with market linkages to alleviate rural poverty. The roles of biovillages and village knowledge centres in providing skill and knowledge empowerment of the resource poor rural women and men have been presented.

G. N. Hariharan and P. C. Kesavan of M.S. Swaminathan Research Foundation in their paper entitled 'Birth and growth of M.S. Swaminathan Research Foundation' describe the purpose of setting up the MSSRF in 1988 (**page 502**). MSSRF harnesses systems approach in agriculture and ecotechnologies in rural development to fight the famines of food and rural livelihoods to avoid causing environmental degradation and social problems. Swaminathan's concept of evergreen revolution requires skill and knowledge empowerment of the rural women and men. The biovillages and the village knowledge centres of the MSSRF provide skill and knowledge empowerment respectively to the largely resource-poor, unskilled and illiterate rural communities.

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– *Guest Editors*