



The Lycurgus Cup made of glass appears red in transmitted light and green in reflected light. The glass contains 70 nm particles as seen in the transmission electron micrograph. The cup itself is dated to 4th century AD, but the metallic holder is a later addition. (Source: <http://www.the-britishmuseum.ac.uk>.)

nanoparticles, dendritic nanostructures and hybrid systems have been discussed for the benefit of readers. Special attention has been drawn on a variety of topics, including molecular electronics, nanolithography, nanomagnetism, nanobiology, nanofluids for cooling technology, transition metal clusters catalysts, etc. Overall, the book has several commendable features and is informative. As this book is pedagogical in nature, I am sure it would stimulate more research and benefit the undergraduate teachers and students who are interested in nanoscience and nanotechnology. The strength of the book is that it introduces 15 experimental procedures that can be useful in designing an experimental course at the undergraduate level. Each chapter is provided with a few review questions that would help teachers and students to strengthen their understanding of the topic.

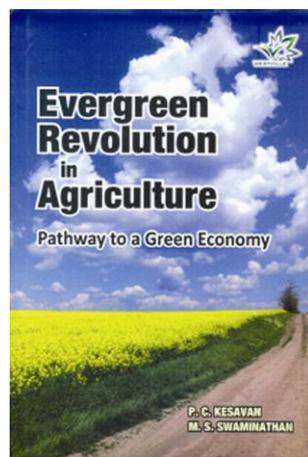
The authors have aimed at a wide spectrum of audience and have been successful to a greater extent. Above all, the classical as well as up-to-date references provide a source of valuable information to students and professionals in the field. Overall, I would strongly recommend this book to the libraries of all educational and R&D institutions, especially where undergraduate course on nanoscience and nanotechnology exists.

I have some general remarks: (a) the size-dependent properties such as optical, thermal, mechanical and thermodynamic properties should have been discussed explicitly, and (b) more emphasis should

have been given to carbon nanostructures such as fullerene, carbon nanotubes, graphene and graphene quantum dots as well as other inorganic nanotubes.

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Evergreen Revolution in Agriculture: Pathway to a Green Economy. P. C. Kesavan and M. S. Swaminathan. Westville Publishing House, 47, B-5, Paschim Vihar, New Delhi 110 063. 2012. v + 139 pp. Price: Rs 695; US\$ 30.00.

The book under review (with chapters 1–10) is an account of the widely known views of the authors about the concept of ‘evergreen revolution’ (which was proposed in mid-1990s) and its possible role in ‘green economy’ (a concept that was proposed more recently). At appropriate places throughout the book, the authors also describe and discuss the steps taken and the results obtained by M.S. Swaminathan Research Foundation (MSSRF) towards achieving the goals of evergreen revolution. The authors also emphasize throughout the book (which sometimes appears repetitive) that although green revolution provided food security and served a useful purpose, it has also caused tremendous harm to the environment and the ecosystem.

In chapter 1, the authors introduce the subject, giving a historical account of

the steps taken globally towards sustainable development and the present needs of a shift from green revolution to evergreen revolution. Chapter 2 deals with the history of green revolution and its success, but with major emphasis on the consequent (but perhaps inevitable) environmental harm that green revolution has caused (they state that by 1990s, ‘green revolution’ turned into ‘greed revolution’). Chapters 3–5 of the book are devoted to ‘evergreen revolution’ (sometimes also described as ‘second green revolution’). Chapter 3 describes the basic concept of evergreen revolution and its comparison with green revolution, emphasizing the need of sustainable agriculture without environmental harm. Throughout this chapter, the authors discuss the harm done by green revolution (at the environmental, social and economic levels), including environmental degradation, poverty, burden on women in farming families, etc. They also state that MSSRF was established in 1988 in Chennai and the concept of evergreen revolution was put forward during 1990s to deal with this difficult situation. In chapter 4, an excellent account of five major ecological foundations of sustainable agriculture (land and soil, freshwater, biodiversity, renewable energy, atmosphere), on which evergreen revolution is based, has been presented, outlining the causes of environmental degradation due to intensive agriculture and other human activities, and the solutions that are possible. Chapter 5 describes the threats and challenges to evergreen revolution, which are real. Among the threats, besides population growth and exploitative (rather than sustainable) utilization of natural resources, recombinant technology is also described as a threat, although many, including the present reviewer, would disagree with this view.

Chapter 6 is devoted to agricultural arrangements needed for production and marketing of agricultural goods under the system of proposed evergreen revolution. These arrangements include cooperatives, farmers’ associations, contract farming, small farm management and special agricultural zones, operation flood (linking farmers and consumers, as followed by dairy industry). Chapter 7 entitled ‘Shaping the future of agriculture in an era of climate change’ deals with the causes of climate change and its consequences. In this chapter, the authors

emphasize that agriculture and forestry, which need to become climate-resilient, themselves substantially contribute to climate change, but since they also consume CO₂, one needs to know the net emission or absorption by agriculture sector. Chapter 8 deals with ecologically benign agriculture, where the authors once again reiterate the harm caused by the green revolution to our physical environment (degraded soil, shortage of freshwater, climate change, and rise in cost of free energy and chemical fertilizers). This is followed by a section on ecofriendly cultivation methods, including organic agriculture, green agriculture, ecoagriculture, white agriculture, etc., which the authors feel would be the basis of evergreen revolution. Chapter 9 is devoted to empowerment of rural communities, and deals with the causes of poverty, undernutrition and hunger in rural India. The authors also believe that the green revolution provided food security only at the national level, but not at the individual level, citing examples of what MSSRF has been doing to solve this problem to bring about empowerment of rural communities (including establishment of self-help groups, bio-village programme, village knowledge centres). Chapter 10 describes green economy in the context of evergreen revolution. It starts with a discussion on RIO92, Millennium Development Goals and RIO + 20 followed by a discussion of green economy within the context of sustainable development and poverty eradication. After briefly mentioning about the UNEP's document on green economy, and its basic requisites, the authors discuss a parallelism between green agriculture and green economy, since according to them both have the same goal of poverty reduction and hunger elimination.

While the authors have done a commendable job in presenting their views on an important subject that is close to their hearts, there are also some weak-

nesses in the book. These partly relate to the format and contents of the book, and partly relate to the feasibility of the very concept that is presented. For instance, the chapters are numbered as 1 to 10 in the contents page, but the titles of the chapters within the book are not numbered, nor are the headings and subheadings within a chapter numbered (some chapters are with no headings or subheadings at all, as in chapters 1–3). In contrast, however, the figures within a chapter are numbered according to the chapter number, which does not occur in the title of the chapter (figures 3.1 to 3.4 in chapter 3). There are also inconsistencies with regard to the listing of key findings/issues within individual chapters; for instance, bullets are used on pages 3, 4, 88 and 129; numerals are used on pages 26, 91–93 and 104, and alphabets (a–h) are used on page 109. While a table is sometimes presented as a figure (figure 8.1, p. 105), at other places, individual tables/figures are not numbered (e.g. a table/figure on p. 40, and a flowchart on p. 115). Pages 63–70 of the book are devoted to some information and photographs (MSSRF, Chennai) without sufficient explanation or legends, and without any citations of these items/photographs in the text, to make them understandable in the context of the subject of the individual chapters; in these pages, flowchart on p. 64 showing development of semi-dwarf wheats, could also be improved with the graphic facility on the computers available now. There are also inconsistencies in writing the references (the first and middle names in most references are given as initials, but in some references, these are given in full; e.g. Fukuoka, Masanobu; Gleick, Peter, H. and Meena Palaniappan).

Throughout the book, the authors advocate environmentally sustainable agriculture, and also discuss that some harm to the environment is inevitable. However, they do not mention anything about the progress (if any) at the national

level made in the field of evergreen revolution, ever since the concept was first proposed ~20 years ago, and do not suggest any approach/strategy for its implementation in future at the national level.

In a nutshell, the father of green revolution, M. S. Swaminathan believes in this book that green revolution has not been ecologically sustainable, which may be true. But the authors do not discuss in any detail, if it was possible to avert the environmental damage that followed the green revolution, and if so, why did we fail on this front, and also if it was inevitable, how evergreen revolution can be successful. In other words, no assessment of the feasibility of a shift from green revolution to evergreen revolution at the national and global levels has been presented. I strongly feel that while the green revolution has been a reality, the evergreen revolution is still a concept that may be difficult (if not impossible) to realize in practice, keeping in view the population pressure and the extravagant lifestyle which most of us cannot do without. This aspect has been adequately covered in the form of threats and challenges in chapter 5 of the book, but once again without recognizing that green revolution was perhaps a necessary evil, which we could not and cannot afford to live without, unless we are prepared to live the way our ancestors did, and are also prepared to control population growth in a manner like China did, which does not seem to be feasible in a democratic setup that we currently have in India.

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