Biodiversity: Implications for Global Food Security. M. S. Swaminathan and S. Jana eds. Macmillan India Ltd., 2/10 Ansari Road, Daryaganj, New Delhi 110 017. 326 pp. Rs. 400.

Thanks to UNCED, biodiversity is today a household word. Actually it is a new name for species-richness (plants, animals and microorganisms) occurring as an interacting system in a given habitat. It is maintained with the support of organic evolution and ecological processes. Without the latter two, biodiversity cannot sustain in space and time. In essence the problem of biodiversity is one of conflict resolution between human being on the one hand, and living creations occurring on land and in freshwater bodies and marine environment on the other. Having become a buzz word, there is considerable myth and illiteracy associated with biodiversity. Therefore, there is not only an urgent need to demystify biodiversity and formulate meaningful programmes for its conservation and utilization, but also make people knowledgeable about it.

Considerable literature has appeared on this subject during the last two years, much of it is rhetoric and, therefore, inconsequential. Viewed against this background, the recent book on the subject (*Biodiversity: Implications for Global Food Security*) edited by the world-famous agricultural scientist M. S. Swaminathan, and an Indian-born Canadian scientist S. Jana, is indeed a refreshing contrast. The book is the product of a very meaningful and well-conceived Project Workshop held at the Swaminathan Foundation at Madras from November 22 to 23, 1991. The workshop coincided with the 104th birthday of the world-famous Russian agrobiologist, N. I. Vavilov, who was born much ahead of his time.

The first six chapters are devoted to the work of Vavilov. Based on his extensive travels throughout the world and detailed studies on the crop plants, their wild ancestors and related species, he was able to delineate 'Centres of Diversity' where crop plants actually arose under the direction of human being (more so of women). These centres fall in tropical/subtropical/hot temperate belt of the world where developing countries are located. These countries have given to the world the cultivated crop plants and domesticated animals which are the backbone of not only agroecosystems of the world, but also agricultural societies at large. However, it is ironical that this is the very region that has very low agricultural productivity and has also been the traditional 'Hunger Belt'. The reason is that this region though gene-rich is indeed technology-poor.

The most successful conservators of the crop plants have been the traditional indigenous people. They have practised this intuitively for ages. Conservation has been encoded in their ethos because of a realization that their survival is intertwined with biodiversity. One marvels at their intuitive power of picking up the right kind of wild grasses, legumes, vegetables and what not, and turn these into crops. The latter after domestication have often become over-evolved with hardly any selective value under natural conditions. Cultivated plants and domesticated animals depend on human being for their survival. It also led to human being becoming son-of-the-soil, and after agriculture there followed culture. Then came the genetic erosion on account of the socio-economic upliftment of the indigenous people who abandoned the traditional cultivars which were genetically highly diverse but with low productivity in favour of cultivars that had low genetic diversity but higher productivity.

The editors have done well in reprinting some classical papers by Th. Dobzhansky and M. S. Swaminathan on the life and work of Vavilov, who was the first conservation biologist. While he was awake about conservation problems, the world was largely asleep. He accomplished a lot in a very short time, and finally was the victim of the Stalin era. He died in exile in Siberia. He was replaced by a pseudogeneticist T. D. Lysenko who had the patronage of the Communist Party. This resulted in putting the clock of Russian agriculture decades behind.

The basic philosophy guiding the Madras Workshop, has been conservation and utilization of biodiversity. This is clearly reflected in the book, which discusses sustainable food security in the second section. Here it has covered not only agricultural crops but also domestic animals, horticultural resources together with papers on rice, amaranths, chenopods, sorghum, pearl millet, chick pea, pigeon pea, ground nut, etc. This part also deals with integrated farming systems, pest management and disease resistance.

The third section deals with technological strategies for sustainable agriculture. A whole range of issues, like monitoring of biodiversity in ecosystems, role of biotechnology of crops, clonal propagation of trees and biofertilizers have been discussed here.

Two points need to be emphasized. One of these pertains to *in situ* and *ex situ* conservation. The present reviewer has always felt that for proper conservation, continuation of organic evolution and ecological processes are of vital importance for maintenance of biodiversity. This is possible only under *in situ* conservation in ecosystems. This alone is true conservation where dynamicity and continuity of the supportive processes are guaranteed. Besides, *in situ* conservation is inexpensive. On the other hand, *ex situ* conservation does not have the benefit of organic evolution and ecological processes. Thus *ex situ* conservation is in fact preservation of genotypes (for details see Khoshoo, T. N., in *Indian Geosphere–Biosphere*, National Academy of Sciences, India, 1991, pp. 178–223).

The second point to be stressed is the relation between biodiversity and bioproductivity. This is depicted in Figure 1. In the harsh and highly fragile ecosystems low biodiversity is accompanied by low productivity. However, stable ecosystems and agroecosystems

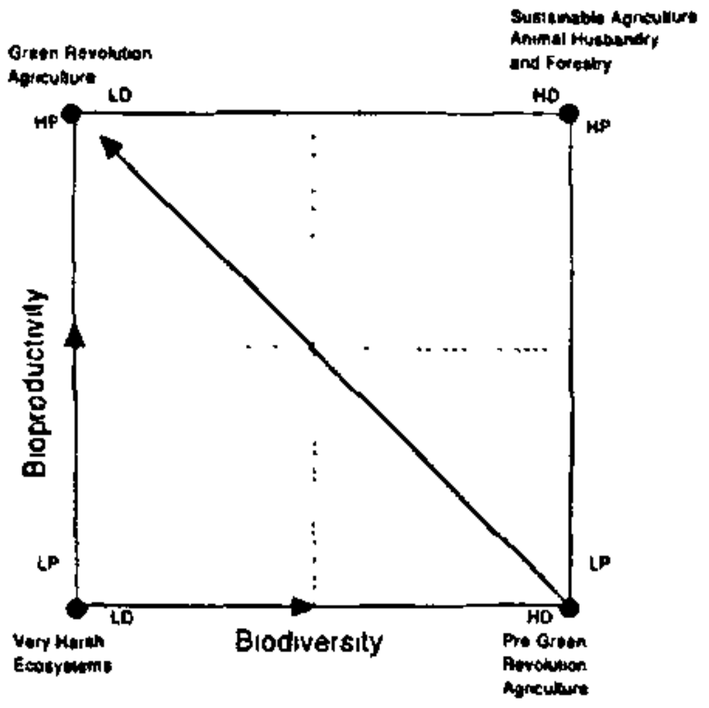

Figure 1. Relationship between bioproductivity and biodiversity.

of the pre-Green Revolution era are based on high diversity associated with low productivity. The Green Revolution agriculture is essentially a combination of low diversity and high productivity. However, experience has shown that Green Revolution in its present form cannot be sustained: sustainability in agriculture, among other things, will depend on high diversity associated with high productivity. Thus our agriculture, animal husbandry, and forestry must work towards such a goal. This means it must fall somewhere in the right hand top square (Figure 1).

The last section deals with the vexing question of the socio-political aspects of biodiversity. The editors have done well to highlight the problems in the last three chapters. Here breeders' and farmers' rights, together with interconnection between biodiversity and biotechnology, have been discussed. The editors have also reproduced in toto the text of Biodiversity Convention and Keystone Dialogues at Oslo and Madras. A perusal of this material would help in better understanding and decision making.

The issue of biodiversity is far more complex and pregnant with tremendous possibilities for a country like India which is gene-rich, and is very strong in genetics and plant breeding and sufficiently strong in biotechnology as relevant to agriculture. However, knowledge base in wildlife (mostly mega animals) is still elementary. There is need for high degree of inputs from modern conservation biology, population genetics and biotechnology. In fact present day zoos and botanic gardens abroad are backed by a very strong biotech component. It is no longer a case of mere increase in number of animals in a given habitat.

There is a serious difference in the thinking of a politician, bureaucrat and scientist/technologist in relation to the time horizon of biodiversity. The life of a democratic government is essentially short. The politician wants gains in the short term and his eyes are on the next election: in any case his time horizon is not more than five years, it could be even a few months. Perception of the politicians about biodiversity has been aptly caught by our world-famous cartoonist, R. K. Laxman (Figure 2). A typical bureaucrat's eyes are on the next promotion. However, the age of an ecosystem harbouring biodiversity is 100 years plus. Who then will provide a long range unbiased perspective on biodiversity for decision making? It has to be a Think Tank of hard core informed scientists, technologists and other professionals.

Figure 2.

I delivered the speech you drafted and it was much appreciated. By the way, what is bio-diversity?

[R. K. Laxman, in *Times of India*, June 18, 1992, New Delhi].

Keeping many of the foregoing aspects in mind, over six years ago, the Government of India was advised by the then Task Force on Environment, of the then Planning Commission, while M. G. K. Menon was the Member (Science). The Task Force was headed by M. S. Swaminathan. Two specific recommendations were forwarded to the Government. One of these was to have a National Biodiversity Conservation Board (NBCB) to look into scientific, technical, social, economic, legal and political aspects of biodiversity. The other recommendation was to appoint a Sustainable Development Advisory Committee to the Union Cabinet. No doubt such advice was ahead of time. Today after UNCED, several countries have constituted NBCBs, and the UN system itself has constituted an UN Commission on Sustainable Development. Most unfortunately our country is still embroiled with Wildlife Board. This Board has met *only once* after the assassination of Mrs. Indira Gandhi in 1984. In any case this Board is defunct: it has lost its legitimacy, and is no longer valid.

Biodiversity is our major strength, and on it depends our survival. We can ill-afford to lose it. Despite stray attempts of some economists, proper economic valuation of biodiversity is still an enigma. The present book is most timely, because ours is basically an agricultural country: our problems are biological and their solutions are in the biotechnological domain. The editors and the publisher deserve congratulations for producing this book which will be read widely.

T. N. KHOSHOO

Tata Energy Research Institute
9 Jor Bagh
New Delhi 110 003, India

Medicinal Chemistry. Ashutosh Kar. Wiley Eastern Ltd., New Delhi. 476 pp + Index. Hard bound. 1993, price: Rs 500.

Medicinal chemistry has received little attention in this country. It is mainly pursued by a few organic chemists and some pharmaceutical chemists. Persistent efforts by a few researchers have yielded therapeutically acceptable new molecules developed in India, e.g. Centchroman, Centbucridine (from CDRI), Chandonium iodide (from Punjab University).

These have been developed by tedious methods of step by step modification of lead compounds and exhaustive screening of analogues. Today with QSAR techniques, drug design aided by computer molecular modelling and graphics, better knowledge of biochemical processes at molecular level, etc., it would be possible to cut short the tedium of search for better drugs. The perfection of biotechnological methods is likely to shift the approach to peptide and nucleotide-related chemical molecules as medicinal agents. Already a number of such molecules are becoming available. Indian organic chemists have successfully devised new synthetic routes to latest drug molecules discovered else-