

But what is the book all about? The title tells you little. The copy on the inside flap tells you that the book is 'essentially meant to be a fun book, but it subtly aims to wake up the reader to the harsh realities of Indian science'. As you begin reading the book, you realize that it is written in the 'rant mode', a litany of woes that beset Indian science: lack of teamwork, nepotism, mindless bureaucracy, lack of commitment, As I mentioned, the list runs to 155 points. Everyone who has served India's science establishment would agree with Salwi's list. But so would everyone who has served India's bureaucracy. The point is that these are the ills that are not unique to Indian science. Just as a scientist who wants to measure air pollution would distinguish between the 'background' level of pollution and that attributable to such specific sources as thermal power stations, we need to know what are the ills that are unique to Indian science. But *Nonsense in Indian Science* fails to tell us. Secondly, it restricts Indian science only to that carried out in state-funded laboratories, ignoring the pioneering contributions of many who worked on their own or were supported by entities other than the state. Science flourishes in this mode even now. Thirdly, in painting Indian science with such a broad brush, the author does injustice to the many who continue to serve Indian science despite crippling odds (though he dedicates the book 'to all those genuine scientists who are suffering due to organized scientific research'). Lastly, in one sweeping statement, he rubbishes all Indian women scientists: 'They (women scientists) simply want some pocket money for their upkeep and to buy sarees till their marriage – and sometimes even after their marriage! . . . they are often not ambitious in the sense that they are willing to yield their credit in research to their guides or bosses! Besides, which Indian scientist wouldn't like a pleasant face or female charm in his otherwise cut and dry, often monotonous, workaday scientific research? Women are therefore preferred in all laboratories!'

That such blatant chauvinism made it past the editor is perhaps less surprising, given the numerous infelicities of expression that the book is riddled with.

Despite the high esteem that scientists enjoy (a recent survey by the *Times of India* reported that scientists scored well on such counts as honesty and respect for the profession), the book is a missed opportunity: the author chose a subject that needs a book to itself, was well-qualified to write one, and selected a 'treatment' that would have proved effective; the publisher was committed enough to publish the book despite what in all probability is only a small market. In doing so, both have done a service to India's science community. If the book prompts at least a few out of the thousands who make up India's science community, and those who administer it, to write at length about what ails Indian science and, more important, how to cure it of those ills – in a style not ponderous and abstract, nor acrimonious and self-centred, but lively and entertaining – the book will have served some purpose.

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Sandal and its Products. A. M. Radomiljac, H. S. Ananthapadmanabho, R. M. Welbourn and K. Satyanarayana Rao (eds). Australian Centre for International Agricultural Research, GPO Box 1571, Canberra ACT2601, Proceedings No. 84. 1998. 203 pp. Price not mentioned.

This is a collection of papers presented at an International Seminar held on 18 and 19 December 1997 at Bangalore, organized by the Institute of Wood Science and Technology, Bangalore and the Karnataka State Forest Department.

Sandalwood (technically the dead, heartwood) and its fragrant oil are two exquisite gifts from the orient to the world. Mysore has been historically associated with the sandal perfumes, agarbathies, carvings and soaps. The paste of sandalwood is used in religious ceremonies and in medicine. Sandalwood (*Santalum album*) is a rather unimpressive small tree (15–29 m high) that occurs wild in India in the regions adjoining Karnataka and Tamil Nadu.

According to some authors sandal is native to India. Others believe that it was introduced from Timor Islands.

A book has to be judged on the basis of its contents and also in comparison with works published recently on the subject. An earlier publication on sandal, edited by Srinivasan *et al.* (1992) has covered aspects such as history, distribution, morphology, soil, silviculture, physiology, chemistry and utilization, diseases and pests, tree improvement, production, export and management. Whereas it is an excellent compilation with a historical perspective, it concentrates entirely on sandalwood in India.

Sandal and its Products has a much wider canvas and deals with 16 species of *Santalum*, distributed in India, Australia, Papua New Guinea, New Caledonia and South Pacific Islands (as depicted in the frontispiece of the volume). If properly utilized on a sustainable basis, sandal has the potential to contribute significantly to rural economies of several countries in the Asia Pacific region. The objectives of the seminar were to bring together the current knowledge on silviculture, propagation, genetics, management of pests and diseases, biotechnology, utilization and importantly to identify the most crucial problems and constraints and recognize research needs and pinpoint priorities and suggest collaborative programmes.

The volume contains 51 articles – some highly technical and original, others general and review type. The editors have grouped them under 5 broad heads for convenience. The status of sandalwood in India has been assessed briefly and strategies for development of sandalwood in farm industry for sustainable utilization by the craftsmen have been outlined.

Among the various species of the genus, *S. album* is the principal source of wood and oil. It is a root parasite (has over 200 hosts) and occurs in forests as well as along fences in cultivated fields and in urban areas. The species is self-incompatible but sets a copious amount of seeds, disseminated by birds attracted by the sweet pulp in the berries. Recognizing the value of sandal as a generator of employment, and revenue (including foreign exchange), Karnataka has declared it as a government tree.

The laws regulating the production and handling of sandalwood are so stringent that large-scale decimation of trees and smuggling continue unabated and out-laws continue to pose a threat to the police and forest officials. Owing to the ban on export of sandalwood from India by the Central Government, international prices have gone up and synthetic santalol (considered inferior to the natural sandalwood oil by the manufacturers of high quality perfumes) and inferior woods of other species of *Santalum* and other genera are being substituted. The losses due to ban on export are serious. It is claimed that over 6000 tonnes of superior quality sandalwood are lying unused in the depots in Tamil Nadu alone, causing an annual loss of Rs 100 crores.

The paper by Kushalappa has underlined that the outmoded and impractical laws in Karnataka have been counter-productive and has advocated rethinking and liberalization of rules, regulations and restrictions. He argues that rosewood, catechu and teak trees are better looked after by private owners and their woods are not under severe threat like sandal.

Sandalwood is difficult to propagate vegetatively. Seed-raised plants are heterozygous. Owing to the excellent work done by P. S. Rao (BARC, Bombay) and Lakshmi Sita (IISc, Bangalore) and their associates, sandal can be micropropagated and the plantlets raised can be hardened and successfully transferred to field conditions. This volume includes several new reports on the same subject, including responses of tissues from healthy and diseased plants. Sandal is also one of the few tree species in which somatic embryos have been produced in bio-reactors and converted into artificial seeds.

There are serious attempts to introduce VAM fungi to the seedlings to ensure better survival, growth and yield under forest conditions. The role of nitrogen fixing and non-nitrogen fixing host plants on sandal has also been discussed. Till recently, the extraction of oil was based on traditional methods such as steam distillation and solvent extraction. The seminar proceedings report recently developed approaches to chemistry and utilization. The paper on the anatomy of sandalwood and identification of adulterants on the basis of wood structure is elegantly presented.

The most valuable part of the book relates to tree improvement. It deals with the identification of provenances; use of alloenzyme markers and their application in population genetics; floral biology and breeding systems. These are areas in which a positive effort can be made in India where trained human resource is available.

The spike disease has been a major scourge of sandalwood, taking a heavy toll of trees. Tips of shoots start bearing little leaves, causing a bushy appearance. At later stages the shoots become bare and sterile and the diseased plants add little heartwood. The nature of the disease and the physiological and biochemical changes caused in the tissues have been intensively investigated in IISc since the early 1930's. The causal organism of the spike disease is a phytoplasma (formerly also called mycoplasma-like-organism or MLO), confirmed by transmission electron microscopy. The unicellular, non-culturable phytoplasma can be specifically stained by using DAPI stain (4,6-diamidino-2-phenyl indole) under the fluorescence microscope. The paper by Sunil and Balasundaram demonstrates the localization of phytoplasma in the phloem tissues of infected plants. Sandal is also attacked by borers leading to die back and mortality of smaller trees. There are also reports that large quantities of heartwood stored in government depots in Tamil Nadu and Karnataka are damaged by borers and termites.

The excellent research done in India on sandal over the past six decades has had little impact in solving the wide range of problems facing this tree of immense cultural and commercial significance. It is time that problem-solving is given serious priority. The seminar has taken note of this malady. Besides suggesting collaborative research in areas that interface, the participants have identified gaps in our knowledge and have listed research needs in their recommendations.

Removal of restrictions on government ownership and encouragement to grow sandal trees on private lands in Karnataka would be measures that need immediate consideration. International support should be provided for evaluation of genetic resources (especially for resistance to spike disease), improvement, breeding, selection and commer-

cial viability of tissue culture-raised plants cloned from exceptional individuals.

The volume has much valuable information and is elegantly produced with excellent illustrations. There are a few avoidable typographical errors, including the spelling of the name of one of the editors. I would recommend this book to foresters, geneticists, breeders, botanists, biotechnologists, pharmaceutical chemists, planners and decision makers.

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Geology of Andhra Pradesh. P. K. Ramam and V. N. Murthy. Geological Society of India, P. B. No. 1922, Gaviapuram, P. O., Bangalore 560 019, India. 1997. 245 pp. Price: Rs 250.

The Geological Society of India has launched a programme to publish textbooks on the geology and/or mineral resources of the different states of the Indian Union and the present book *Geology of Andhra Pradesh* is one among the series of 9 that have so far been published. This book is organized into 16 chapters which cover the descriptions of the geological record from the Archaean to the Holocene time. The authors are experienced field geologists and though they state that the thrust of the presentation is on litho-stratigraphy and field relations (pp. 3-4), they have judiciously mixed the concept and the field data to achieve cogent presentation in the compilation.

There is unity in the operation of a geological process which is manifested worldwide though the type and/or magnitude of a particular process varied with geological time. Further the geological boundaries of the litho-stratigraphic units or tectono-metamorphic belts may transgress the political boundaries of the provinces (states) or the countries. In some states complete geological succession of an epoch/period could have developed