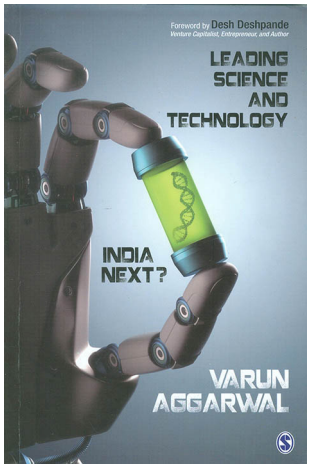

Leading Science and Technology: India Next? Varun Aggarwal. SAGE Publication India Pvt Ltd, B1/I-1 Mohan Cooperative Industrial Area, Mathura Road, New Delhi 110 044. 2018. xxii + 277 pages. Price: Rs 595.

This book is interesting and also informative. The primary objective of the presentation appears to be the reasons behind India's relatively unimpressive achievements in scientific and technological innovation leading to the expected value addition to the country's technological products. The author is correct in stating that economic growth is intimately linked to the standard of scientific and technological research leading to non-trivial innovations. This is the only way that value addition is possible to take the country to the forefront.

The author has presented his analysis of the current situation in India in the first few chapters of the book. In the following chapters he has forwarded suggestions which in his opinion can resolve the existing problems and take the country to a position from where it can play an important role in the economic world. Though most of the points presented and discussed in the book are well known and have been taken for discussion in many forums, the author has been able to nicely substantiate his findings through interesting analyses of available data. It may not add anything new to the current understanding of India's problems, but the presented discussions can strengthen the diagnosis of the ills which the country's S&T activities are suffering from. A data-based analysis can also help the resulting outcome to be less subjective. Interestingly, the author himself appears to have fallen into such a trap. Just quoting one professor's remark from some IIT, he has compared IIT professors to 'frog in the well'. The seriousness of this observation is evident from the special box with the story he has presented. With my experience of working for almost four decades in two major IITs, I find that such comparison is perhaps unkind and baseless.

The author has touched upon a few real issues regarding the relatively lower standard of R&D in India's universities and academic institutions like the IITs. He has correctly observed that the academic standard of postgraduate students in Indian institutions is far lower than those in universities abroad (particularly the industrially developed countries). As a result not only is the quality of their research relatively lower, but they are unable to take part in undergraduate teaching. This puts a huge burden on the professors at the IITs and NITs. This is of course only one of the reasons behind the poor performance by Indian institutions. The problem of publication and citation is also somewhat related to some peculiar bias. Most Indian professors know that in many cases a manuscript sent from India is rejected, though the same work may get accepted when submitted from a well-known university in USA or Europe. Though the affiliation is suppressed in most cases, the reviewer can easily make a guess from the text and references.

The author of this book has correctly touched upon the important issue of autonomy. Even after the establishment of the first IIT at Kharagpur in 1951 (as per the recommendations of the Sarkar Committee appointed by the British Government in 1945) as a Central Government institution, Jawaharlal Nehru correctly realized that true academic excellence can be achieved only if the IIT is made autonomous. Thus, in 1957, Parliament passed the IIT Kharagpur Act, making it autonomous and an Institute of National Importance. General public may not be aware that now such autonomy is being curbed by the actions of Ministry of Human Resource Development (MHRD), Govt of India. Even developing corpus funds by such institutions was discouraged by the government a few years ago. Now the IIT Boards are being persuaded to sign an MoU with the MHRD, surrendering most of the freedom that was granted by the Parliament IIT Act.

The author has pointed out that it is necessary to attract the brighter minds to R&D career. However, the Indian society has changed, such that majority of the top students opt for management and finance-related jobs even after graduating with science and engineering degrees. The huge difference in emoluments (immediately after one's graduation) is the primary reason. This was not the case 40–50 years ago. The author is also correct in stating the ills of a socialistic approach in providing financial grants by the government. In the past, it has generally resulted in subcritical funding leading to trivial results and unimpressive outcome.

Most of the case studies and examples that the author has presented (for understandable reasons) are from computer-related subjects. The problems of innovation in hardware development are different from those related to software development. Except for the mission-based organizations, viz. ISRO, DAE, DRDO, etc. the funding available for the development of new technology is meagre. Almost without exception, the Indian industry feels reluctant to fund any research unless success is assured within a short period. Innovating new technology always has uncertainties and Indian industry has hardly supported such investments.

The author has not commented upon the major difference in education scenarios between India and other developed countries. The school-level education in India has become so examination oriented that there is hardly any scope for development of creative talent among students. Even a vast majority of students who enter the IIT system after clearing one of the toughest examinations, JEE Advanced, hardly show any interest in learning and research. It is perceived that the intensive coaching activities during the pre-university period have resulted in this situation. This is perhaps the single-most important aspect in the system that needs to be corrected. The author has also missed another point. Most of the critically important decisions regarding education in India are taken by bureaucrats motivated by political agenda. The recent explosive growth in the numbers of IITs and NITs has caused immense damage. It should be realized that 'excellence' cannot be up-scaled like this. 'India needs hundreds of IITs' kind of political slogan is heard often, but it

should be remembered that even USA does not have 'hundreds of MITs'. The result of such quick expansion of the IIT–NIT system has been a gradual setting of mediocrity in them, which may dictate the future quality of these 'hundreds of IITs and NITs'.

On the whole this book is interesting and the author needs to be congratulated. The reviewer believes that it will motivate the concerned authorities to take necessary corrective steps.

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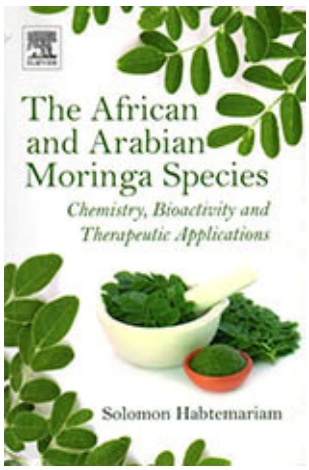

The African and Arabian Moringa Species: Chemistry, Bioactivity and Therapeutic Applications. Solomon Habtemariam. Elseiver, Amsterdam, The Netherlands. 2017. 214 pages. Price: US$ 225. ISBN 78-0-08-102286-3.

Moringa species grow in arid and semi-arid areas with mean annual rainfall below 100 cm. They are usually fast-growing and reach maturity in a couple of years. The species are greatly valued for their traditional uses, socio-economic significance and therapeutic applications. Apart from being used as salad/vegetable, many species are effective in the cure of obesity, diabetes, cancer and other diseases. Further, seeds of *Moringa stenopetala* (Baker.f.) Cufod., the African Moringa, are used in cleansing turbid water in Ethiopia. For these varied and veritable attributes and at different degrees of authenticity/efficacy, a focused publication on these 'miracle plants' is in fact called for and a book of this kind is truly welcome.

Moringaceae, represented by the monotypic genus, *Moringa* was revised by Verdcourt in mid 1980s for tropical East Africa. The taxonomy and diagnostics of these species fluctuate around bipinnate/tripinnate leaves, varied shades of flower colours, and the shape of seeds and presence/absence of wings on them. Verdcourt exhaustively dealt with their taxonomy under three sections, namely, *Moringa* (eight species), *Donadsonia* (three species) and *Dysmoringa* (one species). Solomon Habtemariam, the author of this book, and a leading researcher on drug discoveries from natural sources has reproduced this review in summary relevant to the subject in the first chapter of the publication.

The entire focus of the book is on *M. stenopetala*, distributed in Ethiopia and Kenya and *M. perigrina* (Forssk.) Fiori, distributed along the Red Sea coast from northern Somalia to Egypt and within the Arabian Peninsula from the Persian Gulf to the Red Sea coast. Both the chosen species are extremely valued and exploited for their multiple uses. *M. stenopetala* produces pale yellow or pale green, densely villous flowers in huge panicles and is allied to an Indian species, *M. oleifera* Lam. *M. oleifera*, native to the southern foothills of the Himalaya in northwestern India, is widely cultivated for leaves, flowers and young fruits, and is a fast-growing and drought-resistant species. The seeds of *M. oleifera* are smaller in comparison to those of *M. stenopetala*. Multiple uses and also potentialities of *Moringa* species in general and *M. stenopetala* in particular have been dealt with in great detail in chapter 2.

Section II consists of three chapters focusing entirely on the chemical profiling of this species that includes seed oils and non-oil components (glucosinolates, GSL-derived compounds and flavonoids). Section III addresses the chemistry behind the multiple reported uses of *M. stenopetala* for its antioxidant, anti-microbial, anti-diabetic and anti-cancer properties. Anti-microbial effects have been dealt with in chapter 8, the effects on diabetes and associated diseases in chapter 9, and potential effects on anti-cancer in chapter 10. Emphasis has been given to the correlation between medicinal chemistry and pharmacology/biological activity from the plant at molecular level. The last chapter (#11) in this section is devoted to explaining the flocculation phenomenon and how water purification takes place using seeds of *M. stenopetala*.

The other species, *M. perigrina* has been characterized (chemical and pharmacological profiles) in similar lines in chapter 12 of section IV. The last chapter (# 13) deals with nine other endemic African species, i.e. *Moringa arborea* Verdc., *M. borziana* Mattei, *M. drouhardii* Jum., *M. hildebrandtii* Engl., *M. longituba* Engl., *M. ovalifolia* Dinter & Berger, *M. pygmaea* Verdc., *M. rivae* Chiov. and *M. ruspoliana* Engl.

The focus of the book is extremely relevant today as only a small fraction of the known plant wealth has been put to use for medicinal, nutritional or other requirements. Species diversity and genetic diversity are viewed as a measure of chemical diversity and different species are expected to generate a range of proteins and secondary metabolites which

Moringa drouhardii growing in Florida from a seed of Madagascar origin.