



**Speciality Rices of the World: Breeding Production and Marketing.** Ram C. Chaudhary, D. V. Tran and R. Duffy (eds). Food and Agricultural Organization (FAO) Rome in association with Science Publishers Inc., P.O. Box 699, Enfield, New Hampshire 03748, USA. 358 pp. Price: \$59.

Rice is one of the very few crop species endowed with rich genetic diversity. Over 100,000 landraces and improved cultivars largely account for such a diversity. The Asian cultivar *Oryza sativa* unlike its African counterpart *O. glaberrima* differentiated since its domestication into three geographical races, viz., *indica*, *japonica* (temperate) and *javanica* (tropical japonica) and their ecotypes found in tens of thousands all over Asia constitutes the bulk of the germplasm. Aside selection by nature and man for adaptability to different agroecologies, it was also a largely conscious and continuous selection by man for his diverse quality preferences that led to the varietal diversification. The form, in which man desired to consume rice as a staple and delicacy, had been the basis for selection and nurturing of them for thousands of years. Now we know, it is the difference in the physico-chemical properties of starch that makes varieties/varietal groups distinct and unique. If soft and sticky cooking of *japonica* rices is due to low amylose (~15%) and medium gelatinization temperature, dry and flaky cooking *indica* rices are because of high amylose (>25%) and medium-to-high gelatinization temperature. The rubber-like cooking of the waxy rices popular as 'pudding' rices found in small pockets in south and east Asia is characterized by practically 'no-amylose' (0–5%), while the highly prized aromatic *basmati* and *jasmine* rices respectively of India and Thailand stand in between *indica* and *japonica* rices in their starch characteristics coupled with pleasant aroma and excessive elongation on cooking.

Varieties differing from the typical *indica* or *japonica* varieties in their quality and characterized by certain special quality features may be defined as speciality rices. Except *basmati* rice of India and Pakistan and *jasmine* rice (Khao Dhak Mali) of Thailand, we know no other variety as speciality rice. There are indeed, hundreds of speciality rices, which remain still unknown beyond their habitats. In spite of no large markets for them, they have survived for centuries because of patronage and preference of small local markets. Except for scattered reports, there is hardly any authentic report on their geographical distribution, special features and production-productivity statistics. Nor has there been any serious and systematic effort to inventorize and study them. A recent publication on 'Aromatic Rices' by Singh *et al.* (2000) is an exception to such a knowledge gap. Close on its heels is this book brought out by the Food and Agriculture Organization (FAO), Rome in association with Science Publishers Inc., USA. It is a comprehensive publication on all types of speciality rices including the aromatic ones. Even for seasoned rice breeders, with rich knowledge of rice germplasm, this publication would be a 'gene (knowledge) bank' on the least-known speciality rices of the world. To a reader not necessarily a rice scientist, it would be amazing to know that speciality rices could be so varied and interesting. Countrywise reports reveal this unique group to include besides the widely-known aromatic rices (*Basmati* of the Indian subcontinent and *jasmine* of Thailand), colour rices (red, black, saffron), waxy rices (*puttu* rices of India, *Heinue* of China), wine rices and wild rices (Asian *O. nivara* and American *Zizania aquatica*, which botanically does not belong to rice).

Historical perspectives of and beliefs and facts about these varieties make the publication all the more interesting. For instance, the black coloured rices popularly known by 'black pearl' widely used in food industry are reported to be rich in trace elements like bronze, manganese, molybdenum and vitamins like C<sub>1</sub>, B<sub>1</sub>, B<sub>6</sub>, B<sub>12</sub>, etc. In China, waxy (*Heinue*) rices are believed for ages as 'health rice' with no knowledge of them having high contents of protein, fat, lysine, vitamin B, zinc, calcium and iron. In the days of genetically engineered  $\beta$  carotene rich 'golden rice' we have reports on the existence of yellow colour rices, possibly

with  $\beta$  carotene. Soft rices found at higher altitudes in China and India characterized by very low amylose (<10%) and cooking relatively at low temperature could be energy-saving rices of the future. In the region where rice is the staple food, it is of interest to note that there are varieties exclusively for wine-making and also for feeding animals. Waxy rices belonging to both *indica* and *japonica* varietal groups are the raw material in brewery industry. Over two millions tonnes of rice are converted into wine each year in China and it is quite sizeable in Japan too. 'Feed rice' is of two kinds, viz., grains used as animal feed and the green vegetative part which is used as fodder for livestock. Whereas very high yielding (10–11 t/ha) varieties of coarse grains with high protein not ideally suitable for human consumption are the 'feed rice', other varieties with long vegetative phase amenable to multicut and rich in protein content and quality, are the 'greed feed'.

The scope of the book goes a bit beyond the speciality rices in discussing the ongoing breeding for quality rices in various countries, especially Japan, USA and China, keeping in view the growing demand for high quality rices notwithstanding high cost. The history of development of the super quality variety *Koshihikari*, by Japan which is regarded as *basmati* of India reveals how systematic and meticulous Japanese breeders were in evolving this variety. Research efforts of two and a half decades to combine *basmati* quality in high yield background, which led to the development of Pusa Basmati 1, the world's first high-yielding dwarf *basmati* variety in India is yet another success story in breeding for quality.

The contents of the well-edited publication presented in four parts, including the 'Introduction to speciality rices' by the editors, broadly cover breeding and production of widely popular aromatic rices of the Indian subcontinent and Thailand and other rices of unique quality, which include the glutinous rices of Indo-China and most popular quality rices of Japan, China, USA and Latin American countries. The last chapter on 'Economic aspects of speciality rices' detailing the current trends of rice production, consumption pattern and global market, discusses the changing market demands, increasing preference for and premium offered to high quality rices. Such infor-

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mation should serve as valuable feedback for policy makers and rice scientists to reorient their future research and development priorities.

The excellent and the first-of-its-kind publication covering all aspects of the least known germplasm of great potential, is not without deficiencies. Part II for instance, is devoted exclusively to aromatic rices, and while giving emphasis to the popularly known *basmati* and *jasmine* rices should have included a chapter on aromatic rices of Afghanistan, Iran, and Iraq, which are known to have their own traditional basmati-like scented varieties and on varieties like 'Paw San Honue' of Myanmar. More than one chapter each on Indian and Pakistani *basmati* rices deal with largely similar issues/aspects on crop improvement, looks duplication and this could most certainly have been avoided in order to make the chapter on breeding more comprehensive. A single chapter each on crop management including the production-protection package would have been adequate instead of their being split into separate chapters. In small pockets in India and other countries, preferred varieties of different flavour and grain quality (not of basmati aroma and quality) are being nurtured. Also, varieties of medicinal value are known since long. Exclusive chapters on them under Part III would have enhanced further the value of this otherwise informative publication.

Rice, the staple food for more than one half of the global population, is the maximum researched crop with a wealth of scientific literature on all its aspects. All the information we have so far is about common varieties, and our knowledge on uncommon rices is incomplete. This book is a concerted effort on the part of sixty rice experts from fifteen countries worldwide, who attempt to fill this gap. The credit for bringing out this educative and exhaustive compendium on the least-known varieties goes to the editors and the publishers. Needless to mention that a rare publication of this kind should find a place in all the institutions/laboratories engaged in rice research.

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**Prokaryotic Genomics.** Michel Blot (ed.). Birkhauser Verlag, P.O. Box 133, CH 4010, Basel, Switzerland. 2002. 208 pp. Price not mentioned.

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The genome revolution, which began in the last decade, has resulted in the complete sequencing of several genomes of important prokaryotic and eukaryotic organisms. The availability of completely sequenced genomes has facilitated quick *in silico* based predictions of gene identity and function; identification of drug targets; study of metabolic pathways and elucidation of disease susceptibility, etc. In the midst of this huge euphoria over *in silico* genomics, the equally important (if not more) physical aspect of studying the genome seems to have taken a back seat. In this respect, this book comes as a refreshing change. The book is a part of the *Methods and Tools in Biosciences and Medicine Series* and explains in an easy-to-understand language, various techniques for the physical mapping and analyses of prokaryotic genomes. Important techniques including PFGE, microarrays, microsatellite analyses, genetic footprinting, proteomics, etc. have been dealt with. The book begins with an obituary to Michel Blot, who unfortunately died in an accident in 2002, at the young age of 42 years.

The first chapter by Coline Dale, Howard Ochman and Wendy Smith from the University of Arizona, USA, discusses the physical mapping of bacterial chromosomes. The ability to determine the molecular size of bacterial chromosomes was revolutionized by the advent of the PFGE technique. The description given in this chapter can be used for sizing any bacterial genome. Important information for separation of co-migrating bands as well as other experimental details have been included. The second chapter by Joseph Casadesus and Eva M. Camacho from the Universidad de Sevilla, Spain, deals with two specific genetic mapping approaches to study the *Salmonella typhimurium* genome, viz. conjugation and phage-transduction. Based on the presentation, both techniques can be easily adapted to study other bacterial genomes. Details of the techniques and a troubleshooting guide, have also been included. The third chapter by Dominique Schnieder and Michel Blot from the Université Joseph Fourier, France, describes the importance of insertion elements in

studying prokaryotic genomes. These elements and transposons provide a wonderful tool to generate mutations. However, the chapter is very short and does not include several important aspects such as their use in generating gene knockouts in pathogenic bacteria such as *Mycobacterium tuberculosis*. The fourth chapter by David Metzgar from the Scripps Research Institute, USA, discusses the use of microsatellite sequences in bacterial strain typing. The microsatellite repeats are more common in eukaryotes than in prokaryotes, probably due to the constraint on genome size in bacteria which results in repeat contraction rather than repeat expansion. The chapter is very short and does not provide enough details, probably underscoring the relative unimportance of microsatellite markers to analyse bacterial genomes due to their lower abundance. The fifth chapter by Richard D'Ari and Daniel Vinella from the Institut Jaques Monod, Paris, France, describes the technique for generating gene duplications or deletions *in cis* and the methodology to generate the duplication/deletion at precise chromosomal locations.

The sixth chapter by Anne Thierauf and Stanley Maloy from the University of Illinois and San Diego State University, USA, respectively, describes the popular 'ancient' technique of generalized transduction. The protocol for generalized transduction using the P2 and the P22 phages of *Salmonella typhimurium* have been described in detail and transduction in other bacteria have also been dealt with. The various uses of generalized transduction have also been documented. The next chapter by Lu Zhou, Soo-Ki Kim, Larisa Avramova, Kirill A. Datsenko and Barry L. Wanner from the Purdue University, USA, discusses the use of conditional-replication integration and modular (CRIM) plasmids to generate *lacZ*-reporter fusions. The chapter includes an introduction of the importance of reporter fusions and describes the basic features of a CRIM vector before describing the use of this vector in construction of reporter gene fusions. The technique is described in lucid detail and includes a list of all bacterial strains, consumables and equipment needed to carry out the experiment. One section on troubleshooting and another on applications of the technique are also included and it is probably, the best written chapter in the book. The eighth chapter by Scott S. Walker, from the Schering-Plough Research Institute,