



Breeding Plantation Tree Crops: Tropical Species

(SM Jain and PM Priyadarshan, Editors).

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This is the first part of a 2-volume publication on breeding plantation tree crops. Since this volume deals with ‘tropical species’, we may assume that its second volume will deal with ‘temperate crops’. According to the Preface, “tree species are indispensable to human life. Due to their long life cycle and environmental sensitivity, breeding trees to suit day-to-day human needs is a formidable challenge. Whether they are edible or industrial crops, improving yield under optimal, sub-optimal, and marginal areas calls for united efforts from the scientists around the world... tree crops like cocoa, oil palm, rubber, apple, peach, grapes, and walnut, prove their environmental sensitivity towards tropical, subtropical and temperate climates. Desert climate is quintessential for date palm. Thus, from soft drinks to breweries to beverages, to oil to tyres, the value addition offers a spectrum of products to humankind, enriched with nutritional, environmental, financial, social and trade-related activities... . The contributing authors are internationally known specialists... . All contributory book chapters have been peer reviewed...”. The contents of the volume belie the intentions of the editors. The editors have not defined plantation crops, tropical crops, and trees.

The word ‘plantation’ had its origin in the USA during the Confederacy period, when slave labour taken from Africa was being used in the southern states of the USA, to raise crops, chiefly sugarcane and cotton, in large areas around palatial homes, and they used to be called plantations. Then, from the 19th century, the European colonial rulers had planted extensive areas in south and southeast Asia, central and south America, and west Africa, with tea, coffee, rubber, oil palm, cinchona, and in more recent times, cocoa and bananas, for export to the developed countries. Such estates are also termed plantations.

Because of intensive human selection, cultivation of several crops that used to be grown in only the tropics has now been extended to the subtropics and even temperate regions, and vice versa. But still concensually, some crops are traditionally termed tropical and temperate crops. There is, however, no ambiguity about the botanical term ‘trees’. They are “woody perennial plants typically with a single stem or trunk growing to a considerable height and bearing lateral branches” (Oxford English Dictionary 2006).

The editors of the book are S Mohan Jain, Department of Applied Biology, University of Helsinki, Helsinki, Finland and PM Priyadarshan, Plant Breeder, Rubber Research Institute of India, Regional Station, Agartala, Tripura, India. The contention and meaning of the editors that “there are few books available, which lack comprehensive information on a package of conventional breeding, biotechnology, and molecular tools in crop improvement” is unclear. If they wished to state that no such volumes are available, then they are incorrect. The PROTA and PROSEA volumes are the two most recent examples.

The present volume covers 16 crops – 9 fruit and nut crops: banana, mango, guava, papaya, grape, date palm, litchi, avocado, and cashew; 3 oil crops: coconut, oil palm, and olive; 1 industrial crop: rubber; and 3 beverages: coffee, tea, and cocoa. Of these, botanically, banana and papaya are giant herbs, and grape is a liane; these are not trees. There are also some ‘borderline’ trees: cocoa, litchi, etc. Also, date palm, grapes, and olive are not tropical crops, and some others as litchi and avocado are subtropical to temperate crops.

The editors had apparently given complete freedom to the contributors to prepare their assignments, including the title, length, organization, literature

citations, and in even making mistakes – factual, grammar, punctuations, syntax, etc.! How else can one make out the chaos in most chapters? Given below are a few - only very few - examples; a full list may be longer than the book itself! Only a few chapters attain at least a minimum acceptable norm.

Here are, for instance, some examples of chapter titles: Genetic improvement of the banana, Mango breeding, Breeding papaya (*Carica papaya*), Litchi breeding for genetic improvement, Cashew (*Anacardium occidentale* L.) breeding: a global perspective, Opportunities for the oil palm via breeding and biotechnology, Breeding coffee (*Coffea arabica*) for sustainable production.

Given below are a few excerpts from some chapters to highlight the above comments (on mistakes in facts, language, grammar, punctuations, syntax, etc.). These quotes will speak for themselves.

a. *Bananas* (pp. 3 - 50). “Bananas make up the largest production of fruits and the largest international trade... . Banana products represent an essential food resource and have an important socioeconomic and ecological role... . Bananas are not only consumed as fresh fruits, but also cooked, like plantains... . Cultivated throughout the world, bananas are threatened by several diseases and pests... . Various major fungal diseases are constraints in industrial production... . Great constraints are also exerted by the nematodes... . Those of greatest concern are due to BBTV... . *Musa* L. is currently separated into five sections:... . Several other Australimusa accessions have edible fruits on erected bunches. Named Fei's, they are only cultivated in the Pacific region:... As first suggested by Kurz (1865), Dodds (1943) and Cheesman (1947) show, bananas related to *Eumusa*... .

“*Parthenocarpy* is usually considered as a pure *acuminata* character. It is described by Simmonds (1953) as polygenic. The domestication for starchy fruit was suggested to happen in the area from the Philippines... . Gametic sterility, supposedly with a genetic origin, has been described. Some are independent from parthenocarpy that yields variations in the morphology and physiology of the flowers... Shepherd (1999) structured the species in six groups... . Most banana productions in the world rely on triploids while tetraploidy is considered as the maximum ploidy level giving usually viable plants with... poor fruit post harvest qualities and dropped leaves...”.

“Thus, the global phenotypic diversity of the current triploid varieties resulted from two distinct

phases: a first stage of fixation by the sexuality of ancestral triploid plants followed by a second stage of diversification due to the vegetative propagation of these proto-varieties by humans. In the *Musa* complex, varieties derived from each other by vegetative propagation are related to the same sub-groups. *Musa* structuration, origin and migration of cultivars have been drawn by Champion (1967) and De Langhe (1995). These data are being clarified by linguistic (Rossel 1999) and phytoliths approach. In the previous era, bananas were cultivated from India to the Pacific region...”.

b. *Guava* (pp. 83 - 120). “Guava tree (*Psidium guajava* L.) has its origin in the American tropics... . The fruit contains vitamins A and B and are exceptionally rich in vitamin C (ascorbic acid), superior to that present in the citric juices. According to Ellshoff et al. (1995) *P. guajava* was first named by Linneaus in 1753... . The guava has been cultivated and distributed by man, birds and other animals for so long that its place of origin is uncertain... . Seedless varieties were reportedly common in *P. guajava* as stated by Seth (1959)... . The chromosome number of *P. guajava* was reported as 2n:22, but the level of ploidy was verified...”.

c. *Litchi* (pp. 217 - 245). “*Litchi chinensis* Sonn. ranks (high) among the most important horticultural crops, belongs to the family Sapindaceae and widely grown in tropical and subtropical regions. The tree produces delicious top quality fruits that are in great demand for their wholesome taste, sweet aroma and attractive colour... . Exotic litchi fruits have received worldwide attention. Increase in popularity has necessitated litchi cultivation in a wide range of environmental conditions. In fact, litchi is adapted to various soil types via alluvial sands, loams, heavy clay, organic soil and calcareous soil... . Litchi exhibits appropriate growth in a climate characteristic of the area of its origin... .

“China receives an annual rainfall of 1500 mm having 69-84% humidity in litchi growing areas that is beneficial for the crop. Sunlight intensity also plays detrimental role in litchi cultivation... . It is obvious that different soil/climatic conditions cover different areas of litchi cultivation. Certain elite cultivars, grown through ages in a specific area, are well adapted to soil and climate of that area... . The most important fruit producing city is Gao Zhao (in west Guangdong) near Guaghou (Canton), the very heart of south China on the banks of the Pearl River having boundless expanses of litchi plantations with beautiful dark green dome shaped canopies... . Until the year 2001, the growing areas

exceeded 584,000 ha... . Litchi, one of the most precious fruit crops originated in the southern parts of China where it has been cultivated and owes its origin in the Chinese province of Kwantung and Fukien...”.

d. *Cashew* (pp. 287 - 322). “Its economic importance lies in the commercial value of the kernel extracted from the fruit, one of the tastiest and much appreciated by the nut consumers... . A look at the evolution of the world production of cashew nut gives an understanding on how the geography of production is changing fast... . a number of Asian countries have become important producers that did not appear in the statistics previously... . Cashew belongs to the family Anacardiaceae. The number of species and genera has been well defined. It has been cited ranging from 400 to 600 and 60 to 74, respectively... . Through the classical taxonomy 21 species were recognized. These were subsequently reduced to nine species by numerical taxonomy” (**Reviewer:** actually, only 11 in the genus, 850 in the family, Mabberley 2008).

e. *Rubber* (pp. 469 - 522). “...The invention of vulcanization by Goodyear in 1839 adjudged rubber as prime raw material that was otherwise unknown to mankind for over 450 years,... . It (rubber) staked almost 40% of the export revenue of Brazil till 1940. However, Brazil and adjoining countries of Latin America share only 2% of the production due to the infestation of the SALB. The southeast Asian countries enjoy dominance in rubber production and trade... . Rubber is the strategic raw material for more than 40,000 products... . Rubber is synthesized in over 7500 plant species, confined to 300 genera of seven families... . It (rubber) experiences an immature phase varying from 5 to 9 years... . Improving dry rubber yield is the exclusive objective of *Hevea* breeding... . Derivation of clones for timber has emerged as a recent objective... . Also, there is some interest generated among the scientists to evolve rubber as a factor producing useful chemicals, especially life saving drugs...”.

The botanical name (authority) is not correct. The use of rubber was known to humans (the local population) long before 450 years.

f. *Tea* (pp. 545 - 587). “...tea is the most important for two thirds of the world’s population... . It (tea) has evoked great interest in the medical community in the last few decades as it shows with scientific evidences to prevent a number of human ailments... . Tea has become one of the most important agro-based, ecofriendly, labour intensive, employment generating, export oriented industries in all the tea-growing

countries. Tea occupied 2.7 million hectares of land all over the world... . While India registered 835,200 tonnes of tea in 2004, China being the second largest producer accounts 820,000 tonnes in 2004 (Yajun et al. 2005)... . However, presently tea cultivation is spread within the latitudinal range of 45°N – 34°S. Tea is diploid (2n:30) and karyotype ranges from 1.28 µm to 3.44 µm... . Owing to extensive internal hybridization between different *Camellia* taxa, several intergrades, introgressants and putative hybrids have been formed. These can be arranged in a line based on morphological characters that extend from China types through intermediates to those of Assam types”.

A perusal of the Preface would give the reader the impression that plantation crops suffer from more agronomic problems than any other groups of crop plants. This is not borne by facts. All groups of crop plants suffer from various production and other problems and those of plantation crops cannot be said to be any more than those of other groups of crops. On the contrary, plantation crops/plants may be better buffered against certain adverse environmental and economic factors by their perennial nature.

Though the volume is to deal with ‘breeding’, in most chapters, this topic is dealt with only routinely and casually and without prioritizing and enumerating the objectives either globally or regionally. Several chapters are content to give summaries of some published reports which are not even the most relevant and also recent ones, or of just one or two countries. Botanical names including authorities, families, etc. are given erroneously in places and without following the basic rules of nomenclature. Some authors have given long summaries of their own work (tea, banana, for instance) even when they are of only marginal relevance to crop improvement. The editors and most authors do not even appear to be aware of the correct sources of information on production statistics, taxonomy, nomenclature, etc.

This is a poorly prepared and edited volume, replete with errors of all kinds – of facts, content, grammar, proof reading, and so on. The book has been produced well in keeping with the high standards of the publishers. There are just far too many errors and omissions in the volume that it cannot be recommended for reading/reference unless it is completely revised and updated.

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