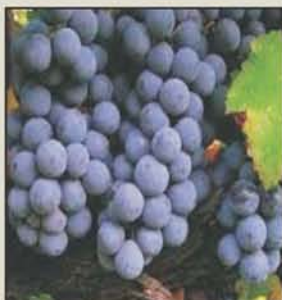




# Systematic POMOLOGY

Om Prakash Pareek  
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# Systematic POMOLOGY

**Volume - 1**

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# FOREWORD

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Fruits have been an important source of human food ever since the dawn of civilization. Rich in nutrients such as vitamins, antioxidants, soluble fibre and minerals, fruits are considered to be the protective class of food. Globally, around 3000 species of different fruits exist, of which about 250 have considerable nutritional and commercial value and thus are being cultivated. Despite this, presently only around 30 species are commercially cultivated with a global production of 654.4 million tons.

The demand for fruits is likely to increase in view of increasing human population, rising income, overall social prosperity and appreciation for consuming healthy food for nutritional security. This obviously calls for widening of the global fruit basket as well as improving their production, productivity and quality.

In order to achieve this, a systematic documentation on description, identification, standard nomenclature and classification of available genetic diversity is a prerequisite.

In this context, the book 'Systematic Pomology' is indeed a welcome addition. Both Drs. O.P. Pareek and Suneel Sharma have provided a very useful account of nearly 375 fruit species belonging to 4 gymnosperm and 70 angiosperm families into a very systematic framework of phylogenetic system of nomenclature and classification developed in 2009 by the Angiosperm Phylogeny Group following the latest code of nomenclature. The general information on description of plant characters, identification, nomenclature and classification along with fairly exhaustive description of specific characteristics of different species are likely to be very helpful in identification of new genotypes/cultivars. Such a comprehensive account will certainly help in systematic introduction and selection of genetic materials in the fruit breeding programme considering their taxonomic proximities and specific characteristics related to fruit bearing, regularity, nutritive and edible quality including aroma and taste, and above all their resistance to biotic and abiotic stresses.

I am sure the information contained in this book will benefit especially the research workers in establishing/maintaining specific germplasm blocks, research orchards or even herbaria. The book is expected to serve as reference material for teachers, researchers, students and all those concerned with fruit flora, particularly those interested in their genetic resources,

breeding and bioinformatics. Above all, this useful compilation would help the commercial fruit growers in selecting the most suitable fruit species/cultivars, locations for their planting and methods of orchard management for achieving higher productivity and profitability.

**R. S. Paroda**

Chairman, TAAS, Pusa Campus, New Delhi

Formerly, Secretary (DARE) and

Director General (ICAR)

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# PREFACE

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Systematic Pomology is an integral part of the science of fruits. Its knowledge is a prerequisite for improvement as well as sustainable and profitable production of fruit crops. The nomenclature and classification of fruit plants had been traditionally done on the basis of the Bentham and Hooker's natural system of classification published in *Genera Plantarum* (1862-1883). Now after the development of the ordinal classification, using new systematic data especially on DNA sequences, for the families of flowering plants by the Angiosperm Phylogeny Group (APG), updated as APG III in 2009, adoption of the concept of phylogenetic nomenclature and classification in fruit species is more appropriate. Also, the latest Code of nomenclature for the cultivated plants should be adopted. Therefore the authors considered it necessary to put the fruit crops into the more systematic framework of the APG system of nomenclature and classification. This requirement has been felt ever since the authors taught the Systematic Pomology course to postgraduate students. In fact, this interest has its roots when one of us (OPP) drew inspiration from the lectures of Prof. Ranjit Singh, an authority on citrus taxonomy, who taught the subject in the Horticulture Division of the Indian Agriculture Research Institute, New Delhi during 1962-63, and from the earlier publications from USA by Prof. F A Waugh (1916) and Prof. Q B Zeilinski (1955). The intention was also to consolidate and update the scattered information for those interested in the subject of fruit science.

With continued work on this task the present book has been brought out in two volumes. The subject matter of the book, having 40 chapters, has been presented in three parts. Part A, with 4 chapters, gives general information on methods for (i) description of plant characters, (ii) identification, (iii) nomenclature, and (iv) classification. In Part B and C, nearly 370 species belonging to 72 families have been grouped based on the Phylogenetic System of Classification of the APG. Part B has Gymnosperm fruits in 3 chapters and Part C has fruits of Angiosperms in 33 chapters. In each chapter, the fruits have been arranged giving their taxonomical status from family to the cultivar level with description of important pomological traits. Comparatively brief narrative is given on the characters at the levels of class, subclass, angiosperm clade, order and family. More emphasis has been laid on the description of characters at species level with considerably exhaustive description at the cultivar level. The book is richly illustrated with figures and photographs. Taxonomic keys have also been given for some species groups. This first volume contains 27 chapters; all the chapters of Part A and Part B and 20 chapters of Part C.

The remaining 13 chapters of Part C along with a references list, fairly exhaustive glossary and an index are continued in the second volume.

The book is intended to serve as a reference material for researchers, teachers, students, fruit growers and all concerned with fruit flora particularly those interested in their genetic resources, breeding and bioinformatics. The knowledge will be useful to a gene bank curator to enable him to systematically maintain fruit germ plasm *in-situ* or *ex-situ* and in herbaria including their proper documentation, to the taxonomists for use not only in preparation of keys and correct identification but also in classifying the fruit genotypes into categories and in removing confusion arising from synonymity in nomenclature. Correct knowledge of origin and evolution of the genotypes will be useful in their systematic use in scientific studies based on the information on their relationships and differences (taxonomic proximities) and also in selecting genetic material (considering specific characters) for use in improvement programmes. In addition, the information would be useful to the commercial fruit growers as a guide book for systematic planting and culture of fruits by selection of the right genotype/cultivar considering their suitability for use as rootstock and as scion material to obtain high productivity and quality of fruits in the given environment.

The authors have drawn information from number of published texts, monographs, books and periodicals for compilation of this work. The authors gratefully thank the organizations Biodiversity International, formally IPGRI Regional Office for Asia, Rome, Italy, ProMUSA, TFNet, Selangor, Malaysia and IITA, Nigeria for using line diagrams/drawings of plant species from their published work. Our special thanks are also due to Dr S.N. Pandey, ex-ADG, ICAR, Dr. Sanjay Singh and Sh Sanjay Patil, CHES, Bikaner, Ms. Monica Lisa, CCS HAU, Hisar, Dr Sunil Pareek MPUAT, Udaipur, Dr. Murlidharan, Date Palm Research Station, Mundra, for providing photographs of cultivars of fruit species used in this publication. Thanks are also due to Dr R.A. Sharma and Dr S. Kathju, CAZRI, Jodhpur for valuable suggestions on portions of the text. Authors are grateful to the Vice Chancellor CCS Haryana Agricultural University, Hisar, and the Director CIAH, Bikaner for the kind encouragement to undertake this task. The task would not have been accomplished without the inspiration, encouragement and support provided by the family members especially Mrs. Kamla Pareek and Mrs. Deepali Sharma.

**O.P. Pareek**  
**Suneel Sharma**



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# CONTENTS

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<i>Foreword</i>	iii
<i>Preface</i>	v
Introduction	1-2
<b>PART A</b>	
Chapter 1- Description of plant characters	5-51
Chapter 2- Plant Identification	52-57
Chapter 3- Nomenclature	58-82
Chapter 4- Classification	83-113
<b>PART B</b>	
<b>GYMNOSPERMAE (GYMNOSPERMS)</b>	
Chapter 5- Ginkgoales	117
Family Ginkgoaceae	117
<b>Maidenhair tree (<i>Ginkgo biloba</i>)</b>	117
Chapter 6- Pinales	119
Family Pinaceae	119
<b>Chilgoza (<i>Pinus gerardiana</i>)</b>	120
<b>Stonepine (<i>Pinus pinea</i>)</b>	120
Chapter 7- Gnetales	121
Family Gnetaceae	121
<b>Spanish joint fir (<i>Gnetum gnemon</i>)</b>	121
<b>PART C</b>	
<b>MAGNOLIOPSIDA (ANGIOSPERMOPSIDA)</b>	
<b>[ANGIOSPERMS]</b>	
Chapter 8- Nymphaeales	125
Family Nymphaeaceae	125
<b>Gorgan nut (<i>Euryale ferox</i>)</b>	126
<b>[CORE ANGIOSPERMS – MESANGIOSPERMS]</b>	
Chapter 9- Magnoliales	128
Family Annonaceae	128
<b>Cherimoya (<i>Annona cherimola</i>)</b>	129
<b>Sweet sop (<i>Annona squamosa</i>)</b>	131
<b>Hanumanphal (<i>Annona atemoya</i>)</b>	133
<b>Bullock’s heart (<i>Annona reticulata</i>)</b>	134

<b>Sour sop (<i>Annona muricata</i>)</b>	135
<b>Soncoya (<i>Annona purpurea</i>)</b>	136
<b>Ilama (<i>Annona diversifolia</i>)</b>	137
<b>Wild custard apple (<i>Annona senegalensis</i>)</b>	138
<b>Pond apple (<i>Annona glabra</i>)</b>	138
<b>Biriba (<i>Rollinia mucosa</i>)</b>	139
<b>Burahol (<i>Stelechocarpus burahol</i>)</b>	140
<b>Pawpaw (<i>Asimina triloba</i>)</b>	140
Chapter 10- Laurales	142
Family Lauraceae	143
<b>Avocado (<i>Persea americana</i>)</b>	144-151
<b>LILIOPSIDA</b>	
<b>(MONOCOTYLEDONS; MONOCOTS; MONOCOTYLEDONAE)</b>	
Chapter 11- Alismatales	154
Family Araceae	154
<b>Ceriman (<i>Monstera deliciosa</i>)</b>	155
Chapter 12- Pandanales	157
Family Pandanaceae	157
<b>Karuka (<i>Pandanus brosimus</i>)</b>	158
<b>[COMMELINIDS]</b>	
Chapter 13- Arecales (Palmales)	160
Family Arecaceae	160
<b>Palmyra palm (<i>Borassus flabellifer</i>)</b>	164
<b>African fan palm (<i>Borassus aethiopum</i>)</b>	165
<b>Coconut (<i>Cocos nucifera</i>)</b>	166
<b>Date palm (<i>Phoenix dactylifera</i>)</b>	170
<b>Date sugar palm (<i>Phoenix sylvestris</i>)</b>	175
<b>Jangli khajur (<i>P. acaulis</i>)</b>	175
<b>Dwarf date palm (<i>P. humilis</i>, <i>P. reclinata</i>)</b>	175
<b>Palawat (<i>P. pusilla</i>), Shelu (<i>P. robusta</i>)</b>	176
<b>False date palm (<i>P. atlantica</i>)</b>	176
<b>Canary island palm (<i>P. canariensis</i>)</b>	176
<b>Dwarf date palm (<i>Phoenix reclinata</i>)</b>	176
<b><i>Phoenix rupicola</i></b>	176
<b>Acai palm (<i>Euterpe oleracea</i>)</b>	177
<b>Babassu (<i>Attalea speciosa</i>)</b>	177
<b>Buriti palm (<i>Mauritia flexuosa</i>)</b>	178
<b>Pataua (<i>Oenocarpus bataua</i>)</b>	179
<b>Pejibaye (<i>Bactris gasipaes</i>)</b>	180
<b>Rakum palm (<i>Salacca wallichiana</i>)</b>	181
<b>Salak palm (<i>Salacca zalacca</i>)</b>	182

<b>Sugar palm (<i>Arenga pinnata</i>)</b>	183
<b>Tucuma (<i>Astrocaryum aculeatum</i>)</b>	184
<b>Doum palm (<i>Hyphaene thebaica</i>)</b>	185
Chapter 14- Zingiberales	186
Family Musaceae	187
<b>Wild plantain (<i>Ensete superba</i>)</b>	191
<b><i>Musa</i> species</b>	191
<b><i>Musa acuminata</i></b>	192
<b><i>Musa balbisiana</i></b>	193
<b>Origin, evolution and distribution of banana and plantain</b>	196
<b>Morphology of banana plant</b>	199
<b>Nomenclature &amp; classification of cultivated banana</b>	204
<b>Banana cultivars</b>	210-225
Chapter 15- Poales	226
Family Bromeliaceae	226
Genus <i>Ananas</i>	227
<b>Pineapple (<i>Ananas comosus</i>)</b>	229
<b>Horticultural groups</b>	230
<b>Pineapple cultivars</b>	233-238
<b>[EUDICOTS]</b>	
Chapter 16- Ranunculales	240
Family Berberidaceae	240
<b>Indian barberry (<i>Berberis aristata</i> DC.)</b>	241
Chapter 17- Proteales	242
Family Nelumbonaceae	243
<b>Lotus (<i>Nelumbo nucifera</i>)</b>	244
<b>American lotus (<i>Nelumbo lutea</i>)</b>	244
Family Proteaceae	244
<b>Macadamia nut (<i>Macadamia integrifolia</i>)</b>	245
<b>Avellano (<i>Gevuina avellana</i>)</b>	245
<b>[CORE EUDICOTS]</b>	
Chapter 18- Dilleniales	248
Family Dilleniaceae	249
<b>Elephant apple (<i>Dillenia indica</i>)</b>	250
Chapter 19- Saxifragales	251
Family Grossulariaceae	251
<b>European gooseberry (<i>Ribes grossularia</i>)</b>	252
<b>Currants (<i>Ribes</i> species)</b>	254-256
<b>ROSIDS</b>	
Chapter 20- Vitales	258
Family Vitaceae	259
Genus <i>Vitis</i>	260

<b>European or old world grape (<i>Vitis vinifera</i>)</b>	266
<b>Fox grape (<i>Vitis labrusca</i>)</b>	281
<b>Summer grape</b>	282
<b>Amur grape</b>	282
<b>River bank grape</b>	283
<b>French-American hybrid grapes</b>	284
<b>Muscadine grape (<i>Vitis rotundifolia</i>)</b>	285-286
<b>[FABIDS: EUROSID I]</b>	
Chapter 21- Zygophyllales	288
Family Zygophyllaceae	289
<b>Desert date (<i>Balanites aegyptiaca</i>)</b>	290
Chapter 22- Fabales	291
Family Fabaceae (Leguminoceae)	291
Subfamily Caesalpinoideae	292
<b>Tamarind (<i>Tamarindus indica</i>)</b>	292
<b>Carob (<i>Ceratonia siliqua</i>)</b>	295
<b>Yeheb nut (<i>Cordeauxia edulis</i>)</b>	295
<b>West Indian locust (<i>Hymenaea courbaril</i>)</b>	296
Subfamily Mimosoideae	296
<b>Khejri (<i>Prosopis cineraria</i>)</b>	297
<b>Tree bean (<i>Parkia roxburghii</i>)</b>	298
<b>African locust bean (<i>Parkia biglobosa</i>)</b>	298
<b>Manila tamarind (<i>Pithecellobium dulce</i>)</b>	299
Subfamily Papilinoideae	299
<b>Tahiti chestnut (<i>Inocarpus edulis</i>)</b>	300
Chapter 23- Rosales	301
Family Rosaceae	301
Subfamily Rosoideae	305
<b>Strawberry (<i>Fragaria</i> species)</b>	305
<b>Rose (<i>Rosa indica</i>)</b>	309
<b><i>Rubus</i> species</b>	310
<b>Brambles</b>	311
<b>Blackberry</b>	312
<b>Raspberry</b>	312
Subfamily Maloideae	315
<b>Quince (<i>Cydonia oblonga</i>)</b>	316
<b>Japanese quince (<i>Chaenomeles japonica</i>)</b>	318
<b>Medlar (<i>Mespilus germanica</i>)</b>	318

<b>Mountain Ash (<i>Sorbus aucuparia</i>)</b>	319
<b>Loquat (<i>Eriobotrya japonica</i>)</b>	319
<b><i>Pyrus</i> species</b>	324
<b>European pear (<i>Pyrus communis</i>)</b>	326
<b>Nashi (<i>Pyrus pyrifolia</i>)</b>	329
<b>Kainth (<i>Pyrus pashia</i>)</b>	332
<b>Ussurian pear (<i>Pyrus ussuriensis</i>)</b>	333
<b>Snow pear (<i>Pyrus nivalis</i>) and <i>Pyrus calleryana</i></b>	333
<b>Chinese white pear (<i>Pyrus x bretschneideri</i>)</b>	333
<b><i>Malus</i> species</b>	334
<b>Apple (<i>Malus</i> × <i>domestica</i>)</b>	335
<b>Service berry (<i>Amelanchier</i> spp.)</b>	348
<b>Saskatoon berry (<i>Amelanchier alnifolia</i>)</b>	349
<b>Black chokeberry (<i>Aronia melanocarpa</i>)</b>	350
<b>Mayhaw (<i>Crataegus aestivalis</i>)</b>	351
Subfamily Amygdaloideae	351
Genus <i>Prunus</i>	352
<b>Almond (<i>Prunus dulcis</i>)</b>	365
<b>Peach and Nectarine (<i>Prunus persica</i>)</b>	368
<b>Apricot (<i>Prunus armeniaca</i>)</b>	373
<b>Plums</b>	382
<b>Asian plum (<i>Prunus salicina</i>)</b>	383
<b>European plum (<i>Prunus domestica</i>)</b>	385
<b>American plums</b>	387
<b>Cherries</b>	387
<b>Sweet cherry (<i>Prunus avium</i>)</b>	387
<b>Tart or sour cherry (<i>Prunus cerasus</i>)</b>	389
Family Elaeagnaceae	390
<b>Seabuckthorn (<i>Hippophae rhamnoides</i>)</b>	391
<b>Oleaster (<i>Elaeagnus angustifolia</i>)</b>	391
Family Rhamnaceae	391
Genus <i>Ziziphus</i>	393
<b>Chinese jujube (<i>Ziziphus jujuba</i>)</b>	396
<b>Sour jujube (<i>Ziziphus acidojujuba</i>)</b>	398
<b>Ber (<i>Ziziphus mauritiana</i>)</b>	398
<b>Jharber (<i>Ziziphus rotundifolia</i>)</b>	404
<b>Japanese raisin tree (<i>Hovenia dulcis</i>)</b>	405

Family Moraceae	405
Subfamily Moroideae	406
<b>White mulberry (<i>Morus alba</i>)</b>	407
<b>Black mulberry (<i>Morus nigra</i>)</b>	408
<b>Red mulberry (<i>Morus rubra</i>)</b>	409
Subfamily Aurtocarpoideae	409
<b>Fig (<i>Ficus carica</i>)</b>	409
<b><i>Artocarpus</i> species</b>	412
<b>Jackfruit (<i>Artocarpus heterophyllus</i>)</b>	413
<b>Breadfruit (<i>Artocarpus altilis</i>)</b>	417
<b>Monkey jack (<i>Artocarpus lakoocha</i>)</b>	419
<b>Chempedak (<i>Artocarpus integer</i>)</b>	419
<b>Marang (<i>Artocarpus odoratissimus</i>)</b>	420
<b>African breadfruit (<i>Treculia africana</i>)</b>	420
<b>Che (<i>Maclura tricuspidata</i>)</b>	421
<b>Paper mulberry (<i>Broussonetia</i> spp.)</b>	421
Chapter 24 Fagales	423
Family Fagaceae	424
Genus <i>Castanea</i> and Chestnut	425
<b>Chinese hairy chestnut (<i>Castanea mollissima</i>)</b>	425
<b>American beechnut (<i>Fagus grandifolia</i>)</b>	431
Family Myricaceae	432
<b>Kafal (<i>Myrica esculenta</i>)</b>	433
Family Juglandaceae	433
<b>Shagbark hickory nut (<i>Carya ovata</i>)</b>	435
<b>Pecan (<i>Carya illinoensis</i>)</b>	435
<b>Persian or English walnut (<i>Juglans regia</i>)</b>	441
<b>Iron walnut (<i>Juglans sigillata</i>)</b>	445
<b>Butternut (<i>Juglans cinerea</i>)</b>	445
<b>Japanese or Siebold walnut (<i>Juglans ailantifolia</i>)</b>	446
<b>Manchurian walnut (<i>Juglans mandshurica</i>)</b>	447
<b>Chinese walnut (<i>Juglans cathayensis</i>)</b>	447
<b>Eastern black walnut (<i>Juglans nigra</i>)</b>	448
<b>North Californian black walnut (<i>Juglans hindsii</i>)</b>	449
Family Betulaceae	449
<b>Hazelnut and cobnut</b>	450

<i>Contents</i>	<i>xiii</i>
Chapter 25- Cucurbitales	454
Family Cucurbitaceae	454
<b>Oyster nut</b> ( <i>Telfairia pedata</i> )	455
<b>Telfairia nut</b> ( <i>Telfairia occidentalis</i> )	456
<b>Cassabanana</b> ( <i>Sicania odorifera</i> )	457
Chapter 26- Oxalidales (Connarales)	458
Family Oxalidaceae	458
<b>Carambola</b> ( <i>Averrhoa carambola</i> )	459
<b>Bilimbi</b> ( <i>Averrhoa bilimbi</i> )	461
Family Elaeocarpaceae	462
<b>Ceylon olive</b> ( <i>Elaeocarpus serratus</i> )	463
<b>Indian olive</b> ( <i>Elaeocarpus floribundus</i> )	463
Chapter 27- Malpighiales	464
Family Euphorbiaceae	464
<b>Mogongo nut</b> ( <i>Schinziophyton rautanenii</i> )	465
<b>Castanha de porco</b> ( <i>Caryodendron amazonicum</i> )	466
<b>Orinoco nut</b> ( <i>Caryodendron orinocense</i> )	466
<b>Conophor nut</b> ( <i>Tetracarpidium conophorum</i> )	466
Family Phyllanthaceae	467
<b>Aonla</b> ( <i>Phyllanthus emblica</i> )	468
<b>Otaheite gooseberry</b> ( <i>Phyllanthus acidus</i> )	471
<b>Baccaurea species</b>	473
<b>Bignay</b> ( <i>Antidesma bunius</i> )	473
<b>Wild loquat</b> ( <i>Uapaca kirkiana</i> )	473
Family Malpighiaceae	474
<b>Barbados cherry</b> ( <i>Malpighia emarginata</i> )	474
<b>Nance</b> ( <i>Byrsonima crassifolia</i> )	475
Family Chrysobalanaceae	476
<b>Cocoplum</b> ( <i>Chrysobalanus icaco</i> )	476
<b>Sansapote</b> ( <i>Licania platypus</i> )	476
<b>Hissing tree</b> ( <i>Parinari curatellifolia</i> )	477
<b>Couepia</b> ( <i>Couepia longipendula</i> )	477
Family Passifloraceae	478
<b>Passiflora species</b>	478
<b>Passionfruit</b> ( <i>Passiflora edulis</i> )	479
<b>Purple passionfruit</b> ( <i>Passiflora edulis</i> f. <i>edulis</i> )	480

<b>Yellow passionfruit</b> ( <i>Passiflora edulis</i> f. <i>flavicarpa</i> )	481
<b>Giant granadilla</b> ( <i>Passiflora quadrangularis</i> )	481
<b>Sweet calabash</b> ( <i>Passiflora maliformis</i> )	482
<b>Banana passionfruit</b> ( <i>Passiflora mollissima</i> )	482
<b>Maypop</b> ( <i>Passiflora incarnata</i> )	483
<b>Water lemon</b> ( <i>Passiflora laurifolia</i> )	483
<b>Sweet granadilla</b> ( <i>Passiflora ligularis</i> )	484
Family Salicaceae (syn. Flacourtiaceae)	484
<b>African dove plum</b> ( <i>Dovyalis abyssinica</i> )	485
<b>Kei apple</b> ( <i>Dovyalis caffra</i> )	485
<b>Kitembilla</b> ( <i>Dovyalis hebecarpa</i> )	485
<b>Governor's plum</b> ( <i>Flacourtia indica</i> )	486
<b>Lovi-lovi</b> ( <i>Flacourtia inermis</i> )	486
<b>Paniala</b> ( <i>Flacourtia jangomas</i> )	487
<b>Rukam</b> ( <i>Flacourtia rukam</i> )	487
Family Caryocaraceae	488
<b>Pequi</b> ( <i>Caryocar brasiliense</i> )	488
Family Irvingiaceae	488
<b>Bush mango</b> ( <i>Irvingia gabonensis</i> )	489
Family Clusiaceae (Guttiferae)	489
<b>Mangosteen</b> ( <i>Garcinia mangostana</i> )	491
<b>Mundu</b> ( <i>Garcinia dulcis</i> )	492
<b>Gamboge</b> ( <i>Garcinia tinctoria</i> )	492
<b>Som-Khack</b> ( <i>Garcinia atrovirdis</i> )	492
<b>Cerapau</b> ( <i>Garcinia prainiana</i> )	492
<b>Gorakha</b> ( <i>Garcinia cambogia</i> )	492
<b>Imbe</b> ( <i>Garcinia livingstonei</i> )	493
<b>Kokam</b> ( <i>Garcinia indica</i> )	493
<b>Cowphal</b> ( <i>Garcinia cowa</i> )	494
<b>Malabar tamarind</b> ( <i>Garcinia gummi-gutta</i> )	494
<b>Bakuri</b> ( <i>Platonia insignis</i> )	494
<b>Madrono</b> ( <i>Rheedia madruno</i> )	495
<b>Mammee apple</b> ( <i>Mammea Americana</i> )	496



---

# CONTENTS

---

[MALVIDS : EUROSID II]

Chapter 28- Myrtales	499
Family Combretaceae	499
<b>Indian almond</b> ( <i>Terminalia catappa</i> )	500
<b>Baheda</b> ( <i>Terminalia bellirica</i> )	501
<b>Chebulic myrobalan</b> ( <i>Terminalia chebula</i> )	501
<b>Okari nut</b> ( <i>Terminalia kaernbachii</i> )	502
Family Lythraceae (Punicaceae)	502
<b>Pomegranate</b> ( <i>Punica granatum</i> )	503
<b><i>Punica protopunica</i> and <i>P. granatum</i> var. <i>nana</i></b>	506
<b>Water chestnut</b> ( <i>Trapa natans</i> )	506
Family Myrtaceae	507
<b>Guava</b> ( <i>Psidium guajava</i> )	508
<b><i>Psidium cattleianum</i>, yellow strawberry guava</b> <b>(<i>P. cattleianum</i> var. <i>lucidum</i>), Lemon guava (<i>P. cattleianum</i></b> <b>var. <i>acre</i>), Costarican guava (<i>P. friedrichsthalianum</i>),</b> <b>Puertorican guava (<i>P. microphyllum</i>), <i>P. montanum</i>,</b> <b><i>P. guayabita</i> and <i>P. fluviatile</i></b>	517
<b>Feijoa</b> ( <i>Acca sellowiana</i> )	518
<b>Jamun</b> ( <i>Syzygium cumini</i> )	519
<b>Water apple</b> ( <i>Syzygium aqueum</i> )	520
<b>Java rose apple</b> ( <i>Syzygium samarangense</i> )	521
<b>Rose apple</b> ( <i>Syzygium jambos</i> )	522
<b>Malay rose apple</b> ( <i>Eugenia malaccensis</i> )	523
<b>Pitomba</b> ( <i>Eugenia luschnathiana</i> )	523
<b>Araca-boi</b> ( <i>Eugenia stipitata</i> )	524
<b>Grumichama</b> ( <i>Eugenia dombeyi</i> )	524

<b>Surinam cherry</b> ( <i>Eugenia uniflora</i> )	525
<b>Camu-camu</b> ( <i>Myrciaria dubia</i> )	526
<b>Jaboticaba</b> ( <i>Myrciaria cauliflora</i> )	526
<b>Rumberry</b> ( <i>Myrciaria floribunda</i> )	527
<b>Downy myrtle</b> ( <i>Rhodomyrtus tomentosa</i> )	527
<b>Chilean cranberry</b> ( <i>Ugni molinae</i> )	528
<b>Allspice</b> ( <i>Pimenta dioica</i> )	529
Chapter 29- Sapindales	531
Family Burseraceae	531
<b>Java almond</b> ( <i>Canarium indicum</i> )	533
<b>Pili nut</b> ( <i>Canarium ovatum</i> )	533
<b>Dabai</b> ( <i>Canarium odontophyllum</i> )	534
<b>Sofou</b> ( <i>Dacryodes edulis</i> )	534
Family Anacardiaceae	535
<b>Mangifera species</b>	536
<b>Mango</b> ( <i>Mangifera indica</i> )	539
<b>Binjai</b> ( <i>Mangifera caesia</i> )	559
<b>Horse mango</b> ( <i>Mangifera foetida</i> )	560
<b>Kuwini</b> ( <i>Mangifera odorata</i> )	560
<b>Bambangan</b> ( <i>Mangifera pajang</i> )	561
<b>Gandaria</b> ( <i>Bouea gandaria</i> )	562
<b>Cashew</b> ( <i>Anacardium occidentale</i> )	563
<b>Pistachio</b> ( <i>Pistacia vera</i> )	568
<b><i>Pistacia terebinthus</i> P. atlantica and P. chinensis</b>	569
<b>Ambarella</b> ( <i>Spondias dulcis</i> )	571
<b>Yellow mombin</b> ( <i>Spondias mombin</i> )	571
<b>Amra</b> ( <i>Spondias pinnata</i> )	571
<b>Purple mombin</b> ( <i>Spondias purpurea</i> )	572
<b>Marula nut</b> ( <i>Sclerocarya birrea</i> )	573
<b>Chironji</b> ( <i>Buchanania lanzan</i> )	574
Family Sapindaceae	574
<b>Litchi</b> ( <i>Litchi chinensis</i> )	575
<b>Longan</b> ( <i>Dimocarpus longan</i> )	584
<b>Rambutan</b> ( <i>Nephelium lappaceum</i> )	587
<b>Pulasan</b> ( <i>Nephelium ramboutan-ake</i> )	591
<b>Akee</b> ( <i>Blighia sapida</i> )	592

<b>Mamoncillo (<i>Melicoccus bijugatus</i>)</b>	593
<b>Fijian longan (<i>Pometia pinnata</i>)</b>	593
<b>Pitombeira (<i>Talisia esculenta</i>)</b>	594
<b>Yellow genip (<i>Talisia oliviformis</i>)</b>	595
<b>Guarana (<i>Paullinia cupana</i>)</b>	595
<b>Indian horse chestnut (<i>Aesculus indica</i>)</b>	596
Family Rutaceae	596
<b>Wampee (<i>Clausena lansium</i>)</b>	600
<b>Orange Jesamine (<i>Murraya paniculata</i>)</b>	601
<b>Box orange (<i>Severinia buxifolia</i>)</b>	603
<b>Kumquats</b>	604
<b>Large round kumquat (<i>Fortunella crassifolia</i>)</b>	605
<b>Marumi or Round kumquat (<i>Fortunella japonica</i>)</b>	605
<b>Nagami or Oval kumquat (<i>Fortunella margarita</i>)</b>	605
<b>Hong Kong wild kumquat (<i>Fortunella hindsii</i>)</b>	606
<b>Dwarf kumquat (<i>Fortunella hindsii</i> var. <i>chintou</i>)</b>	606
<b>Changshou kumquat (<i>Fortunella obovata</i>)</b>	607
<b>Australian desert lime (<i>Eremocitrus glauca</i>)</b>	607
<b>Trifoliate orange (<i>Poncirus trifoliata</i>)</b>	608
<b>Mexican orange or Finger lime (<i>Microcitrus australasica</i>)</b>	609
<b>Red pulp finger lime (<i>Microcitrus australasica</i>)</b>	610
<b>Australian round lime (<i>Microcitrus australis</i>)</b>	610
<b>Russel river lime (<i>Microcitrus inodora</i>)</b>	610
<b>Maiden's Australian wild lime (<i>Microcitrus maideniana</i>)</b>	610
<b>Mount white lime (<i>Microcitrus garrowayi</i>)</b>	611
<b>New Guinea wild lime (<i>Microcitrus warburgiana</i>)</b>	611
<b>Citrus species</b>	611
<b>Citron (<i>Citrus medica</i>)</b>	615
<b>Fingered citron (<i>Citrus medica</i> var. <i>sarcoclactylis</i>)</b>	617
<b>Grapefruit (<i>Citrus paradisi</i>)</b>	617
<b>Lemon (<i>Citrus limon</i>)</b>	619
<b>Limes</b>	622
<b>Sour lime (<i>Citrus aurantifolia</i>)</b>	622
<b>Tahiti or Persian lime (<i>Citrus latifolia</i>)</b>	624
<b>Sweet lime (<i>Citrus limettioides</i>)</b>	624
<b>Mandarin (<i>Citrus reticulata</i>)</b>	625

<b>Satsuma mandarin</b> ( <i>C. unshiu</i> )	626
<b>King mandarin</b> ( <i>C. nobilis</i> )	627
<b>Mediterranean mandarins</b> ( <i>Citrus deliciosa</i> )	627
<b>Common mandarins</b> ( <i>Citrus reticulata</i> )	628
<b>Calamondin</b> (x <i>Citrofortunella mitis</i> )	631
<b>Rangpur or Canton lemon</b> ( <i>Citrus limonia</i> )	632
<b>Ugli</b> ( <i>C. reticulata</i> x <i>C. maxima</i> or <i>C. x paradisi</i> )	632
<b>Pummelo</b> ( <i>Citrus maxima</i> or <i>C. grandis</i> )	632
<b>Sweet orange</b> ( <i>C. sinensis</i> )	637
<b>Sour orange</b> ( <i>C. aurantium</i> )	642
<b>Rough lemon or Jambhiri</b> ( <i>Citrus jambhiri</i> )	643
<b>Karna khatta</b> ( <i>C. karna</i> )	643
<b>Bael</b> ( <i>Aegle marmelos</i> )	644
<b>Wood apple</b> ( <i>Limonia acidissima</i> )	646
<b>White sapote</b> ( <i>Casimiroa edulis</i> )	647
Intgeneric hybrids	647
Intrgeneric hybrids	649
<b>Tangors</b> ( <i>C. sinensis</i> x <i>C. reticulata</i> )	649
<b>Tangelos</b> ( <i>C. reticulata</i> x <i>C. paradisi</i> )	649
Family Meliaceae	650
<b>Langsat</b> ( <i>Lansium domesticum</i> )	651
<b>Santol</b> ( <i>Sandoricum indicum</i> )	653
Chapter 30- Malvales	654
Family Muntingiaceae	655
<b>Jamaica cherry</b> ( <i>Muntingia calabura</i> )	655
Family Malvaceae	656
<b>Phalsa</b> ( <i>Grewia asiatica</i> or <i>G. subinaequalis</i> )	657
<b>Durian</b> ( <i>Durio zibethinus</i> )	659
<b>Matisia</b> ( <i>Quararibea cordata</i> )	662
<b>Baobab</b> ( <i>Adansonia digitata</i> )	663
<b>Malabar chestnut</b> ( <i>Pachira aquatica</i> )	664
<b>Kola nut</b> ( <i>Cola acuminata</i> )	664
<b>Cocoa</b> ( <i>Theobroma cacao</i> )	665
<b>Cupuassu</b> ( <i>Theobroma grandiflorum</i> )	668
Chapter 31- Brassicales (Capparales)	669
Family Moringaceae	669

<b>Drumstick tree (<i>Moringa oleifera</i>)</b>	670
Family Caricaceae (Papaya family)	670
<b>Papaya (<i>Carica papaya</i>)</b>	671
<b>Mountain papaya (<i>Vasconcellea pubescens</i>)</b>	678
<b>Toronche (<i>Vasconcellea stipulate</i>)</b>	679
<b>Babaco (<i>Vasconcellea heilbornii</i>)</b>	681
<b>Chamburo (<i>Vasconcellea</i> × <i>heilbornii</i> var. <i>chrysopetala</i>)</b>	681
Family Salvadoraceae	682
<b>Indian mustard tree (<i>Salvadora oleoides</i>)</b>	683
Family Capparaceae	683
<b>Ker (<i>Capparis decidua</i>)</b>	684
Chapter 32- Santalales	685
Family Olacaceae	685
<b>Galo nut (<i>Anacolosa frutescens</i>)</b>	686
<b>African walnut (<i>Coula edulis</i>)</b>	686
<b>Tallow wood plum (<i>Ximenia americana</i>)</b>	687
Family Santalaceae	687
<b>Quandong (<i>Santalum acuminatum</i>)</b>	688
Chapter 33- Caryophyllales	689
Family Polygonaceae	690
<b>Seagrape (<i>Coccoloba uvifera</i> L.)</b>	690
Family Cactaceae (Cactus family)	690
<b>Prickly pear (<i>Pereskia aculeata</i>)</b>	692
<b>Barbados gooseberry (<i>Opuntia ficus-indica</i>)</b>	694
<b><i>Hylocereus</i> species</b>	695
<b>Pitahaya</b>	696
<b>Strawberry pear (<i>Hylocerus undatus</i>)</b>	696
Family Simmondsiaceae	697
<b>Jojoba (<i>Simmondsia chinensis</i>)</b>	697
<b>ASTERIDS</b>	
Chapter 34- Cornales	699
Family Cornaceae (Dogwood family)	699
<b>Cornelian cherry (<i>Cornus mas</i>)</b>	700
Chapter 35- Ericales	701
Family Lecythidaceae	702
<b>Brazil nut (<i>Bertholletia excelsa</i>)</b>	703
<b>Monkey pot (Paradise nut or Sapucaia nut) <i>Lecythis</i> spp.</b>	703
( <i>L. pisonis</i> , <i>L. zabucao</i> , <i>L. elliptica</i> , <i>L. lanceolata</i> )	

<b>Sapodilla (<i>Manilkara zapota</i>)</b>	706
<b>Khirni (<i>Manilkara hexandra</i>)</b>	710
<b>Miracle berry (<i>Synsepalum dulcificum</i>)</b>	711
<b>Argan tree (<i>Argania spinosa</i>)</b>	711
<b>Shea butter tree (<i>Vitellaria paradoxa</i>)</b>	712
<b>Star apple (<i>Chrysophyllum cainito</i>)</b>	713
<b>Mamey sapote (<i>Pouteria sapota</i>)</b>	714
<b>Canistel (<i>Pouteria campechiana</i>)</b>	715
<b>Abiu (<i>Pouteria caimito</i>)</b>	715
<b>Mahua (<i>Madhuca longifolia</i>)</b>	716
<b>Indian butter tree (<i>Diploknema butyracea</i>)</b>	717
Family Ebenaceae	717
<b>Japanese Persimmon (<i>Diospyros kaki</i>)</b>	718
<b>American persimmon (<i>Diospyros virginiana</i>)</b>	720
<b>West African ebony (<i>Diospyros mespiliformis</i>)</b>	720
<b>Velvet apple (<i>Diospyros blancoi</i>)</b>	720
<b>Black sapote (<i>Diospyros digyna</i>)</b>	721
<b>Date plum (<i>Diospyros lotus</i>)</b>	722
<b>Mabola persimmon (<i>Diospyros tomentosa</i> and <i>Diospyros discolor</i>)</b>	722
Family Actinidiaceae	722
<b><i>Actinidia</i> species</b>	722
<b>Kiwifruit</b>	728
<b>Fuzzy kiwifruit (<i>Actinidia deliciosa</i>)</b>	729
<b>Golden kiwi (<i>Actinidia chinensis</i>)</b>	731
<b>Hardy kiwi (<i>Actinidia arguta</i>)</b>	733
<b>Arctic kiwifruit (<i>Actinidia kolomikta</i>)</b>	733
Family Ericaceae	733
<b>Cranberry and Blueberry (<i>Vaccinium</i> spp.)</b>	735
<b>Highbush blueberry (<i>Vaccinium corymbosum</i>)</b>	736
<b>Half high bush berries (<i>V. angustifolium</i> x <i>V. corymbosum</i>)</b>	739
<b>Rabbiteye blue berries (<i>Vaccinium ashedi</i>)</b>	740
<b>Lowbush blueberry (<i>Vaccinium angustifolium</i>)</b>	740
<b>Cranberry (<i>Vaccinium macrocarpon</i>)</b>	741
<b>Lingon berry (<i>Vaccinium vitis-idaea</i>)</b>	741
<b>[LAMIIDS: EUASTERID I]</b>	
Chapter 36- Rubiales (Gentianales)	744
Family Rubiaceae	744

Spanish tamarind ( <i>Vangueria madagascariensis</i> )	745
Borojoa ( <i>Borojoa patinoi</i> )	746
Genipap ( <i>Genipa americana</i> )	746
Family Loganiaceae	746
Kaffir orange ( <i>Strychnos spinosa</i> )	747
Family Apocynaceae	747
Karonda ( <i>Carissa carandas</i> )	748
Natal plum ( <i>Carissa macrocarpa</i> )	749
<i>Carissa bispinosa</i> and <i>Carissa spinarum</i>	749
Cow tree ( <i>Couma utilis</i> )	749
Chapter 37- Boraginales	751
Family Boraginaceae	752
Gonda ( <i>Cordia myxa</i> )	752
Chapter 38- Solanales	754
Family Solanaceae	754
Cape gooseberry ( <i>Physalis peruviana</i> )	755
Tree tomato ( <i>Solanum betaceam</i> )	756
Orinoco apple ( <i>Solanum topiro</i> )	756
Naranjilla ( <i>Solanum quitoense</i> )	757
Chapter 39- Lamiales	758
Family Oleaceae (olive family)	758
Olive ( <i>Olea europea</i> )	759
Family Lamiaceae (mint family)	762
Black plum ( <i>Vitex doniana</i> )	763
[CAMPANULIDS: EUASTERID II]	
Chapter 40- Dipsacales	765
Family Adoxaceae syn. Sambucaceae (Elder family)	765
Elderberry ( <i>Sambucus canadensis</i> )	766
Highbush cranberry ( <i>Viburnum trilobum</i> )	767
REFERENCES	768-799
GLOSSARY	800-883
SUBJECT INDEX	884-909





## Annona



Balanagar



Arka Sahan



African Pride

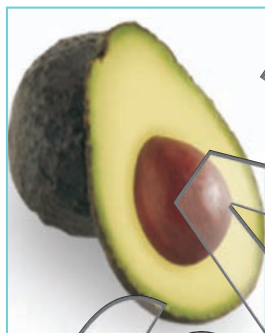


Mammoth

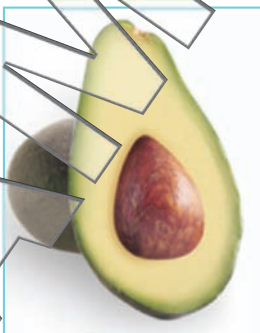


Atemoya

## Avocado (Griesbach, 2005 & CHES, Chethali)



Hass



Fuerte



Zutano



Pinkerton



CHES A-1

## Coconut (CPCRI, Kasaragod, Kerala)



Chowghat Orange Dwarf



Kalpa Mitra

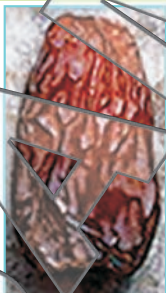


Kalpa Sankara (CGDxWCT)



VPM 3

## Date Palm (Dr. C.M. Muralidharan, Date palm Research Station, Mundra)



Medjool



Halawy



Barhee



Zahidi



Khuneizi



Banana



Fe'i



Bluggoe



Grand Naine



Poovan



Robusta



Red Banana



Rasthali



Nendran

Pineapple (TFnet, 2008)



Kew



Mauritius

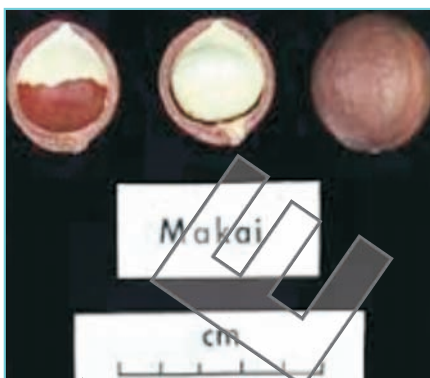


Queen



Smooth Cayenne

## Macadamia



White currant (White Dutch)



Red currant



Strawberry (Camarosa)

## Grape



Thompson Seedless



Ruby Seedless



Sonaka



## Pomegranate (Monalisha Hota and IIHR, Bengaluru)



Bhagwa



Mridula



Arka Ruby



Ganesh



G-137



Wonderful

## Guava (TFNet, 2008)



Allahabad Safeda



Lucknow 49



Apple Colour



Ruby Supreme



Arka Rashmi



Arka Mridula



Arka Kiran



Hisar Safeda

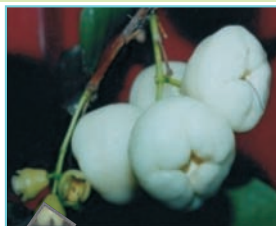
## Wax apple (TFNet, 2008)



CHESM- 1



Green Red Wax Jambu



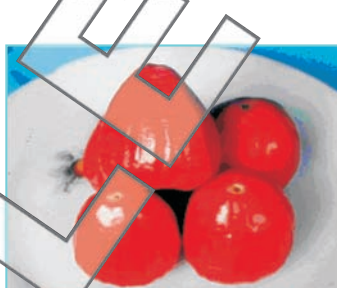
Kong White Wax Jambu



Black Diamond Wax Jambu



Java Wax Apple



Malay Rose Apple

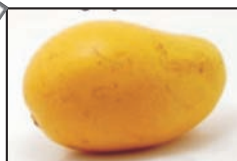
## Mango (Dr. S.N. Pandey; Griesbach, 2005; IIHR, Bangalore)



Dashehari



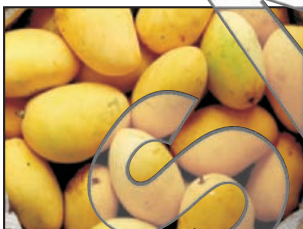
Langra



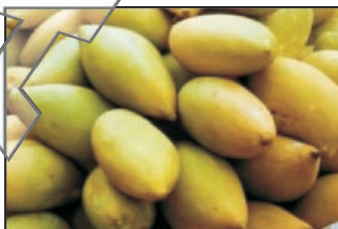
Banganpalli



Mulgoba



Chausa



Totapari



Alphonso



Alphonso



Amrapali



Fazli

**Mango (Dr. S.N. Pandey; Griesbach, 2005; IIHR, Bangaluru)**



Gulabkhas



Arka Anmol



Arka Aruna



Arka Neelkiran



Arka Puneet



Anupam



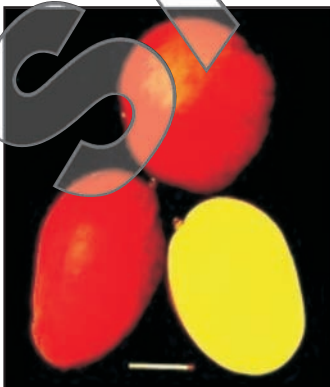
Ambika



Kensington



Sensation



Tommy Atkins



Haden



## Litchi



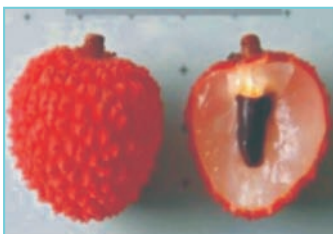
China



Kwai Mi



Purbi



Early Seedless



Rose



Swarna Roopa



Longan

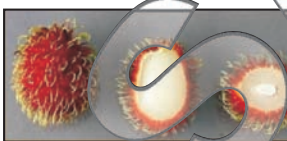


Langsat



*Nephelium ramboutan-ake*  
(Labill.) Leenh

## Rambutan (TFNet, 2008)



R3 (Gula Batu)  
from Malaysia



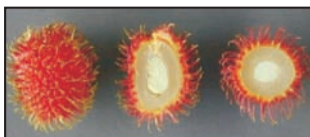
Seematjan



Binjai (from Indonesia)



Arka Coorg Arun



R167 ('Chai Tow Cheng')  
from Malaysia



CHES- 26