MANUAL OF SEEDS OF FOREST TREES, BAMBOOS AND RATTANS

K.C. Chacko R.C. PandalaiDivision of Silviculture

K.K. Seethalakshmi Division of Plant Physiology

C. Mohanan Division of Plant Pathology

George MathewDivision of Entomology

N. Sasidharan
Division of Non Wood Forest Products



Kerala Forest Research Institute Peechi 680 653, Kerala, India

August 2002

© 2002 Kerala Forest Research Institute

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, mechanical or electronic, without permission from the publisher.

This publication is brought out with the financial support of the Forests and Wildlife Department, Government of Kerala, Thiruvananthapuram.

KFRI Research Report No. 243 (Final Report of the Research Project KFRI 323/99: Studies on forest seeds of Kerala)

ISBN 81-85041-40-7

KFRI Library Cataloguing-in-Publication Data

Manual of seeds of forest trees, bamboos and rattans

- 1. Seeds forest trees, bamboos, rattans 2. Forest trees seeds
- 3. Bamboos seeds 4. Rattans seeds
- I. Chacko, K.C., et al. II. Kerala Forest Research Institute

0.232.31

Photographs: Subhash Kuriakose

Printed at Lumiere, Thrissur - 680 020, Kerala, India

CONTENTS

Foreword		vii
Preface		ix
	gements	
1. Principles	s and practices of seed science and technology	
	duction	
1.1.1	Definition of seed	
1.1.2	Importance of seed	1
1.1.3	Importance of seed handling	1
1.2. Seed	collection	1
1.2.1	Collection time	1
	Maturity indices	
	Genetic quality of seeds	
	Managed seed sources	
1.2.5	Collection methods	. 3
	dling between collection and processing	
	Reduction of bulk	
	Maintaining viability	
1.3.3		5
1.3.4	Drying of fruits and seeds	5
	Seed extraction from dry indehiscent fruits	
1.3.6	Temporary field storage	6
1.4. Tran	sportation	6
1.5. Seed	l processing	6
1.6. Seed	l storage	8
1.6.1	Classification of seed storage potential	8
	Storage conditions	
	Storage of orthodox seeds	
1.6.4	Storage of recalcitrant and intermediate seeds	10
1.6.5	Insect and fungal problems of stored seeds	12
	Protection of seeds under storage	
1.7. Dorn	mancy and pretreatment	15
	Seed dormancy	
1.7.2	Pretreatments to overcome seed dormancy	17

	1.8. S	eed testing
		8.1 Terminology
	1.	8.2 Seed testing schedule
		8.3 Sampling
	1.	8.4 Drawing samples
	1.	8.5 Standard seed testing parameters
		8.6 Other seed testing parameters
		01
2.	Infor	mation on selected forest seeds
	2.1	Acacia auriculiformis
	2.2	A. dealbata
	2.3	A. mangium
	2.4	A. mearnsii
	2.5	A. nilotica
	2.6	Acrocarpus fraxinifolius
	2.7	Adenanthera pavonina
	2.8	Aegle marmelos
	2.9	Ailanthus excelsa
	2.10	A. triphysa
	2.11	Albizia amara
	2.12	A. lebbeck
	2.13	A. odoratissima
	2.14	Alnus nepalensis
	2.15	Alstonia scholaris
	2.16	Anogeissus latifolia
	2.17	Artocarpus hirsutus
	2.18	Azadirachta indica
	2.19	Bambusa bambos
	2.20	Barringtonia acutangula
	2.21	Bauhinia malabarica
	2.22	B. racemosa
	2.23	B. variegata
	2.24	Bombax ceiba
	2.25	B. insigne
	2.26	Butea monosperma
	2.27	Caesalpinia coriaria
	2.28	Calamus brandisii
	2.29	C. hookerianus
	2.30	C. pseudotenuis
	2.31	C. rotang
	2.32	C. thwaitesii
	2.33	C. travancoricus
	2.33	Calonbullum inonbullum
	2.34	Calophyllum inophyllum
	2.36	Casuarina equisetifolia
	2.50	Cuootu jiotutu

2.37	Chloroxylon swietenia
2.38	Chukrasia tabularis
2.39	Dalbergia latifolia
2.40	D. paniculata
2.41	D. sissoo
2.42	D. sissoides
2.43	
2.43	Delonix regia Dendrocalamus strictus
2.44	
	Diospyros ebenum
2.46	Dysoxylum malabaricum
2.47	Eucalyptus camaldulensis
2.48	E. globulus
2.49	E. grandis
2.50	E. tereticornis
2.51	Ficus religiosa
2.52	Gliricidia sepium
2.53	Gmelina arborea
2.54	Grevillea robusta
2.55	Grewia tiliifolia
2.56	Haldina cordifolia
2.57	Holoptelea integrifolia
2.58	Hopea parviflora
2.59	Hydnocarpus pentandra
2.60	Jacaranda mimosifolia
2.61	Kydia calycina
2.62	Lagerstroemia microcarpa
2.63	L. parviflora
2.64	L. speciosa
2.65	Macaranga peltata
2.66	Mangifera indica
2.67	Melia azederach
2.68	M. dubia
2.69	Michelia champaca
2.70	Mimusops elengi
2.71	Muntingia calabura
2.72	Neolamarckia cadamba
2.73	Ochlandra ebracteata
2.74	
2.75	O. scriptoria
2.76	O. setigera
2.76	O. travancorica
	O. travancorica var. hirsuta
2.78	O. wightii
2.79	Paraserianthes falcataria
2.80	Peltophorum pterocarpum
2.81	Persea macrantha

	2.82	Phyllanthus emblica	
	2.83	Pongamia pinnata	
	2.84	Pseudoxytenanthera ritcheyi	
	2.85	Pterocarpus marsupium	
	2.86	Pterygota alata	
	2.87	Santalum album	
	2.88	Saraca asoca	
	2.89	Schleichera oleosa	
	2.90	Semecarpus anacardium	
	2.91	Spondias pinnata	
	2.92	Sterculia urens	
	2.93	Strychnos nux-vomica	
	2.94	Swietenia macrophylla	
	2.95	S. mahagoni	
	2.96	Syzygium cumini	
	2.97	Tamarindus indica	
	2.98	Tectona grandis	
	2.99	Terminalia arjuna	
	2.100	T. bellirica	
	2.101	T. catappa	
	2.102	T. chebula	
		T. crenulata	
	2.104	T. paniculata	
		Thespesia populnea	
	2.106	Thyrsostachys oliveri	
	2.107	Toona ciliata	
		Vateria indica	
	2.109	V. macrocarpa	
		Wrightia tinctoria	
		Xylia xylocarpa	
	2.112	Zanthoxylum rhetsa	
	2.113	Ziziphus mauritiana	
2	D (
3.	Keter	ences	
4.	Gloss	ary	
	Appe	ndix. I. Format used for each species with brief explanation of the content	S
	Appe	ndix. II. List of forestry seed suppliers in India and other countries	
	Index		
	111411		

FOREWORD

In production forestry, seed is still the main propagule for raising large-scale plantations, even though plants raised through tissue culture or vegetative propagation offer alternatives. This is due to the fact that seeds are economical to use and easy to handle as compared to other types of propagules.

Since, now the thrust is on increasing the productivity of plantations through planting stock improvement, knowledge about the quality of seeds attains great significance. In this context, the "Manual of Seeds of Forest Trees, Bamboos and Rattans" is a timely publication brought out with the assistance of the Kerala Forest Department. I am sure, this manual will serve as a useful field guide both for foresters and researchers.

I congratulate the scientists and the Director, Kerala Forest Research Institute, for their effort in bringing out this valuable Manual which will fill a major gap in information on forestry seeds. I would advise all the forest officials and other users to make use of the Manual in best possible way and give their suggestions or inputs, if any, to KFRI for incorporating them during the revision of the Manual in future.

14 August 2002 Thiruvananthapuram **P.K. Surendranathan Asari** IFS Principal Chief Conservator of Forests Forests & Wildlife Department, Govt. of Kerala

PREFACE

For production of quality planting stock, it is essential to use healthy mature seeds. For planting programmes, usually seeds are required in large quantities, which need to be collected at the right stage of maturity and stored for future plantation programmes. This requires a fairly good understanding of seed biology of the species. Lack of information on appropriate protocols for seed collection, handling and storage can result in deterioration of seed quality and use of substandard seed and wastage of labour and money. There was a long felt need for a manual on forest seeds of Kerala, which is fulfilled through this publication, which brings out for the first time all the required information on forest seeds relevant to Kerala.

This manual, through its introductory chapter, presents the basics of seed science and technology and provides detailed treatise on 113 species of trees, bamboos and rattans grown in Kerala. Nursery practices are also briefly dealt with. Source of information is provided to help the users, especially the researchers for acquiring further details if needed. Information where source is not acknowledged, is based on studies carried out at KFRI as well as field experience of the authors. I am sure, the Manual will be a useful field guide for the officers of the Forest Department, researchers and others involved in seed collection, handling and seedling production.

August 2002 Peechi. **Dr. J.K. Sharma**Director
Kerala Forest Research Institute

ACKNOWLEDGEMENTS

We are indebted to Dr. J.K. Sharma, Director, KFRI, for encouragement and advice. We are grateful to Sri.P.K. Surendranathan Asari, PCCF and Sri. D.S. Rao, CCF (D), Kerala Forest Department for funding the project under the Kerala Forest Development Fund.

We sincerely thank Dr. R. Gnanaharan, Research Co-ordinator, and our colleagues, Dr. K.K.N. Nair, Dr. C. Renuka and Dr. K.V. Bhat for valuable editorial comments. Thanks are also due to Mr. Subhash Kuriakose for photographs.

Messers. S. Abdul Kader, Salvy Thomas and C. Heralad John rendered valuable assistance in collecting data from nursery and literature, and compiling the Manual. We place on record our thanks to them.

Authors