Natural Fibres Handbook With Cultivation & Uses







Natural Fibres

Handbook with Cultivation & Uses

by
NIIR Board
of
Consultants & Engineers



नेशनल इंस्टीट्यूट ऑफ इन्डस्ट्रियल रिसर्च National institute of industrial Research 106-E, Kamla Nagar, Delhi-110 007 (INDIA)

CONTENTS

1. INTRODUCTION		1
The Occurence and Nature of	Vegetable Fibres	
Bast Fibres	gmiasviah	
Leaf Fibres		
Fibre Identification		
Testing of Fibres		
Chemical Analysis		
Fibre Fineness and Commerc	ial Use	
THE MALLOW PARKET WAS	CVACEARMENT TO VILLE OF	
2. FLAX FAMILY (LINACE)	AE)	20
Flax (Linum Usitatissimum)		
Conditions Necessary for Grov	wing Flax	
Varieties	Cultivation	
Cultivation		
Harvesting		
Pulling		
Drying		
Retting		
Dew Retting		
Water Retting		
Warm-Water Retting		
Leaching		
Double Retting		
Aerated Retting		
Green Flax		
Scutching		
Flax in the U.S.S.R		
Flax in Belgium		
Flax in Other Countries		
China		
Japan		
Egypt		
India		
Australia		
New Zealand		
Kenya		

Uganda

Grading of Flax Properties of Flax Trade

3. MULBERRY FAMILY (MORACEAE)

53

Hemp (Cannabis Sativa)

Botany

Breeding Experiments

Cultivation

Harvesting

Yield

Retting

Breaking and Scutching

Hemp in China

Hemp in Chile

Quality of Hemp

Properties and Uses of Hemp

4. LIME FAMILY (TITLIACEAE)

70

Jute (Corchorus Capsularis and C. Olitorius)

Cultivation

Soil

Preparation of the Soil

Sowing

Varieties

Harvesting

Retting

Extraction of Fibre

Cost of Production

Jute in Brazil

Jute in China

Production in Taiwan

Experiments on Mechanized Production of Jute

Varieties

Cultivation

Harvesting

Ribboning

Scutching

Retting

Washing

Drying and Storage

Sorting and Grading

Production of Jute in Other Countries

Burma

U.S.S.R

Borneo Malaya

Philippines

Thailand

Nepal

Vietnam

Iran

Peru

Miscellaneous Countries

Sorting and Grading of Jute

Uses of Jute

The Jute Trade

Triumfetta Species

Honckeny Ficifolia

'Funga' Fibre (Cephalonema Polyandrum)

5. MALLOW FAMILY (MALVACEAE)

121

Knaf (Hibicus Cannabinus)

Varieties

Sowing

Harvesting

Growth Phases

Retting

Pests and Diseases

Kenaf in India

Kenaf Production in Various Other Countries

Argentina

China

Egypt

Guatemala

Haiti

Italy

Mexico

Mozamibque

North Africa

Papua and New Guinea

Peru

Southern Rhodesia

Spain

Thailand

South Africa

Economics of Kenaf

The Use of Unretted Kenaf Ribbons for Sack Manufacture

Properties of Kenaf

Roselle (Hibiscus Sabdariffa)

(vii)

Fibres From Other Species of Hibiscus
Urena Lobata
Cultivation
Retting
Yields
Distribution
Labour Requirements in Fibre Preparation
Grading of the Fibre
Properties and Uses
Trade
Abutilon Species

Abutilon Species
Sida Species
Pavonia Species
Thespesia Species

Miscellaneous Fibre Plants of the Malvaceae

6. NETTLE FAMILY (URTICACEAE)

Ramie (Boehmeria Nivea and its Var. Tenacissima)

Varieties

Soils and Growing Conditions

Planting

Harvesting

Yields

Replanting

Fibre Extraction

Degumming

Problems of Ramie Degumming

Drying

Ramie in China

Varieties in China

The Ramie Industry in Japan

Varieties Grown

Pests and Diseases

Grading of Ramie in Japan

Spinning of the Fibre

Ramie in Taiwan

Ramie in Brazil

Ramie in Other Countries

Uses of Ramie Fibre

Properties of Ramie

The Trade in Ramie

Other Fibre-Yielding Plants of the Urticaceae

7. PEA FAMILY (LEGUMINOSAE)

Sunn or Sunn Hemp (Crotalaria Juncea)
Varieties in India

210

Growing Conditions
Harvesting and Yield
Retting
Washing and Stripping
Preparation of Hanks
Cleaning and Dressing
Grading
Cost of Production
Sunn Hemp in Ceylon
Properties and Uses of Sunn Hemp
Trade and Prices
Spanish Broom (Spartium Junceum)
Sesbanea Aculeata

8. STERCULIA FAMILY (STERCULIACEAE) 2

Abroma Augusta
Cultivation
Harvesting
Yields
Fibre Extraction
Properties of the Leaf

9. THE MECHANIZED PRODUCTION OF STEM FIBRES 229

Large Labour Requirements of Non-Mechanized Production
Advantages of Mechanized Production
Harvesting Mechanically
Ribboning Machines
Problems of Ribboning
Drying
Retting
Washing
Costs of Mechanized Production

10. AGAVE FAMILY (AGAVACEAE)

Agave Species
Botany
Fibre Yields of Various Species
Breeding Experiments With Agave Species
Nature of the Fibres in the Agave Leaf
Sisal (Agave Sislana)
Cultivation
Climate and Soil
Preparation of the Land

Planting

Fertilizers

Harvesting

Yields

Decortication and Decorticating Machines

Flume Tow

Structure of the Sisal Industry

Drying

Artificial Drying

Brushing

Grading

Baling

Labour Requirements for Sisal Production

Sisalana in Brazil

Production in Other Countries

Properties of Sisal

Uses of Sisal

Trade

Henequen (Agave fourcroydes)

Cultivation

Harvesting

Decortication

Drying

Uses

Trade

Cantala (Agave Cantala)

Cultivation

Harvesting

Retting

Uses

Trade

Agave Letonae

Fibres from other Agave species

11. NARCISSUS FAMILY (AMARYLLIDACEAE) 322

Furcrea Species

Mauritius Hemp (Furcrea Gigantea Var. Willemettiana)

Yields

Extraction of the Fibre

Retting

Uses of the Fibre in Mauritius

Properties of the Fibre

Furcraea Gigantea

Furcraea Cabuya

Furcraea Macrophylla

Furcraea Andina Furcraea Humboldtiana Furcraea Cubensis Curculigo Species

12. LILY FAMILY (LILIACEAE)

344

New Zealand Flax (Phorium Tenax)
Production of Phormium in New Zealand
Varieties
Propagation
Cultivation

Diseases, etc. Harvesting Stripping

Washing & Bleaching

Scutching

Baling and Grading

Advantages and Disadvantages of Phormium Production

Production and Costs

Phormium Tenax in Argentina

Phorium Tenax in South Africa
Phorium in Other Countries

Properties of *Phorium* Fibre

Trade

Sansevieria Species

Propagation and Cultivation

Lily Family (Liliaceae)

Extraction of the fibre

Production in Mexico
Other Countries

Yield

Properties

Yucca And Some Relatives

13. PINEAPPLE FAMILY (BROMELIACEAE)

376

Pineapple Fibre (Ananas Comosus)

Cultivation

Production in the Philippines

Production in Other Countries

Extraction by Machine

Pita Fibre or Silk Grass (Aechmea magdalenae)

Harvesting

Yield

Caroa Fibre (Neoglazovia variegata)

Fibre From Other Members of the Bromeliaceae

14. BANANA FAMILY (MUSACEAE)

390

Abaca or Manila Hemp (Musa Textilis)

Varieties

Cultivation

Propagation

Diseases and Pests

Harvesting

Extraction of the Fibre

Grading of the Fibre in the Philippines

Production of Abaca in Central America

Cost of Producing Abaca

Production in Borneo

Abaca in Malaya

Canton And Pacol Fibres

Properties of Abaca

Uses

Trade

Fibres From Other Species of Musa and a Related Genus

15. PALM FAMILY (PALMAE)

427

Coir or Coconut Fibre (Cocos nucifera)

Collection of Fruit

Removal of Husks

Retting

Production of Coir Yarn

Grading of Yarn

Costs of Production

Cost of Production of Fibre and Yarn

Mattings

Bristle or Coco Fibre

Dyeing of Coir Fibre

Mattress Fibre and 'Combings'

Production of Coir Fibre in India

Production in the Philippines

Machine Extraction of Coir Fibre

Properties of Coir

Trade

Crin Vegetal (Chamaerops humilis)

Botany

Distribution

The Industry in Morocco

Extraction of the Fibre

Uses of the Fibre

Technical Characteristics

Trade

Tucum Fibre (Bactris Setosa)

Date Palm Fibre (Phoenix Dactylifera)

'Doum' Fibre (Hyphaene Thebaica)

16. BOMBAX FAMILY (BOMBACACEAE)

459

Kapok (Ceiba Pentandra)

Soils

Propagation

Yields

Harvesting

Hulling

Drying

Removal of Seeds

Baling

Kapok in India

Collection of the Floss

Preparation

Grading

Baling

Properties of Kapok Fibre

Uses of Kapok

17. MILKWEED FAMILY (ASCLEPIADACEAE) 471

Akund Floss (Calotropis Procera and C. Gigantea)

Yields

Preparation

Grading and Packing

Trade

Uses

Kendyr Fibre (Apocynum Venetum)

Asclepias Species

18. BRUSH-MAKING FIBRES

476

Fibres Used in Earlier Times

Properties Required in Brush-Making Fibres

Bahia Piassava (Attalea funifera)

Botany and Germination

Collection and Preparation of the Fibre

Properties and Uses

Para Piassava (Leopoldinia Piassaba)

West African Piassava (Raphia Hookeri and R. Graolis)

Madagascar Piassava (Vonitra Fibrosa)

Mexican Fibre (Agave lechequilla)

Harvesting and Extraction of the Fibre

Cleaning and Grading
Uses
Jaumave Fibre (Agave Funkiana)
Coco Fibre (Cocos Nucifera)
Palmyra or Bassine Fibre (Borassus Flabellifer)
Kitool Fibre (Caryota Urens)
Gomuti Fibre (Arenga Saccharifera)
Broom Root (Muhlenbergia Macroura)
Italian Whisk (Sorghum Vulgare)
Palmetto Fibre (Sabal Palmetto)

19. PAPER-MAKING FIBRES

Properties for Paper-Making
Treatment for Conversion into Pulp
Wood
Esparto Grass
Collection from Wild Plants in North Africa
Production in Spain
Treatment and Uses
Straw
Bamboo
Bagasse
Other Materials

20. MISCELLANEOUS FIBRES

Toquilla (Carludovica Palmata)
Preparation For Making Panama Hats
Weaving and Bleaching
Alpinia Chinensis
Polygala Gomesiana And Other Sources or Rope, etc.

502

511