

# INTERNATIONAL TROPICAL TIMBER ORGANIZATION

## ITTO

### PROJECT PROPOSAL

TITLE	COMPREHENSIVE STUDIES ON THE STRUCTURE AND PROPERTIES OF RATTANS FOR EFFECTIVE UTILIZATION
SERIAL NUMBER	PD 21/95 Rev.2 (I)
PERMANENT COMMITTEE	FOREST INDUSTRY
SUBMITTED BY	GOVERNMENT OF CHINA
ORIGINAL LANGUAGE	ENGLISH

#### SPECIFIC OBJECTIVES

- (1) To make systematic studies on structure, properties and utilization of rattans imported from Southeast Asia and West Africa;
- (2) To establish a comprehensive database which can be questioned commercially from many different view points;
- (3) To compile information and knowledge of rattans and to disseminate to potential importers and users in the world.

EXECUTING  
AGENCY

INSTITUTE OF BOTANY, CHINESE ACADEMY OF SCIENCES

COOPERATING  
GOVERNMENTS

GOVERNMENT OF CHINA

DURATION

4 YEARS

APPROXIMATE  
STARTING DATE

MARCH 1996

BUDGET AND PROPOSED  
SOURCES OF FINANCE

Source	Contribution in US\$	Local Currency Equivalent
ITTO	88,620	
Gov't of China	56,000	
TOTAL	144,620	

## PART I. LEGAL CONTEXT

This project is in accordance with Chapter 1, Article 1 of the ITTA which states that:

(c) To promote and support research development with a view to improving forest management and wood utilization.

The project is particularly relevant to the following areas of ITTA states in Chapter VII, Article 23, paragraph 5:

- (b) Natural forest development;
- (c) Reforestation development;
- (e) Institutional framework, National planning.

The project on utilization of tropical rattans is consistent with the criteria as laid down in the ITTA, Chapter VII, Article 23, paragraph 6 which reads:

- (a) They should be related to the production and utilization of industrial tropical timber;
- (b) They should yield benefits to the tropical timber economy and be relevant to producing as well as consuming members;
- (c) They should be related to the maintenance and expansion of the international tropical timber trade;
- (d) They should offer reasonable prospects for positive economic returns in relation to costs; and
- (e) They should make maximum use of existing research institutions and, to the greatest extent possible avoid duplication of efforts.

The project also relates to the ITTO Action Plan on Criteria and Policy Areas for Programme Development and Project Work as stated under part 4-Strategies and Action Plan: Forest Industry, especially on the following:

- (d) Promotion of more efficient processing and use of tropical timber including waste reduction and recovery and utilization of logging residues.

## PART II. THE PROJECT

### 1. OBJECTIVES

#### 1) Development objectives

To make effective utilization of rattan stems in the industry by introducing and transferring the knowledge on their properties and utilization of rattans to the units of producing countries.

To reduce the pressure on the major tropical timber species by expanding the uses of rattans in the industry.

To enhance the international trade between rattan-producing and consuming countries by providing a comprehensive database with a large quantity of useful information.

#### 2) Specific Objectives

To make systematic studies on structure, properties and utilization of rattans imported from Southeast Asia and West Africa.

To establish a comprehensive database which can be questioned commercially from many different view points.

To compile information and knowledge of rattans and to disseminate to producing countries and users in the world.

### 2. BACKGROUND AND JUSTIFICATION

Rattans are spiny climbing palms comprising the subfamily Calamoideae (Uhl & Dransfield, 1987). The subfamily consists of 22 genera, of which 13 genera are rattans with about 650 species. Rattans are mainly distributed in two tropical regions: West Africa, with 4 genera (Calamus, Eremospatha, Laccosperma and Oncocalamus) of which tree are endemic and Southeast Asia, the much larger and more important area with ten genera (Calamus, Calospatha, Ceratolobus, Caemonorops, Korthalsia, Myrialepis, Plectocomia, Plectocomiopsis, Pogonotium and Retispatha).

Rattan stems are one of the remarkable Non-Timber Forest Products (NTFP) used for furniture and handicrafts. Owing to the lack of resources, many consuming countries had to import millions of tons of raw materials or processed canes from tropical regions. With this, the development of rattan resources offers much

employment opportunity to the local people and has become one of the important source of foreign-revenue in the countries like Malaysia, Indonesia, Papua New Guinea, The Philippines and Nigeria.

Rattan stems have been a topic of many investigations for several decades. As early as in 1845, Mohl described the large metaxylem vessel of its vascular bundle of Calamus as peculiar in comparison with the other genera of the Palmae. Tomlinson (1961) gave a description of the nine genera of rattan in "Anatomy of the Monocotyledons". Siripatanadilok (1974) and Teoh (1978) investigated the anatomical structure with a view to differentiating of several genera. Recently, Weiner & Liese (1990) have made an analysis of the structural components of eight genera from Southeast Asia. For the purpose of promoting better production and use of bamboo and rattan, a series of technical reports were issued and a large amount of information was collected by International Network for Bamboo and Rattan (INBAR) which is managed by IDRC and hosted by IDRC Regional Office in New Delhi. However, neither a comprehensive study concerning anatomical characterization, properties and utilization of rattan stems nor a comprehensive database to relate the anatomical structure of rattan stem to their known and potential uses is made. In order to encourage and emphasize the necessity of retaining a diversity in tropical forests and sustained use of a wide range of species, it is essential to further our investigation on structural characterization as well as properties of rattan stems so as to introduce their properties also to consumers and to extend their uses in the industry.

In the past 6 years, two projects on the structure, properties and utilization of over 100 species of grass fibers (mainly Gramineae) including bamboos and reed have been completed under the support of Natural Science Foundation of China. Resulting from these, a database has been established and a full report was published (Hu et al. 1986). Needless to say, the completion of the projects has laid down a solid base for designing and carrying out this proposal.

#### REFERENCES:

- Hu Yushi et al. 1986. Structure, properties and utilization of grass fibers. Science Press. Beijing.  
Siripatanadilok, S. 1974. Anatomical investigation of Javanese rattan canes as a guide to their identification. BIOTROP, Faculty of Forestry, Kasetsart University, Thailand.  
Tgeoh Bee Woon. 1978. An exploratory anatomical survey of some Malayan rattans. School Biological Sciences, University of Malaya.  
Tomlinson, P.B. 1961. Anatomy of the monocotyledons II. Palmae. Oxford University Press, Oxford.  
Weiner, G & W. Liese. 1990. Rattans - Stem anatomy and taxonomic implications. IAWA Bulletin n.s 11 (1):61-70.

#### 3. OUTPUT

- 1) To submit a research report on structure, properties and utilization of over 200 species of important rattan stems imported from Southeast Asia and West Africa;
- 2) To establish a database as information resources including name of species (Latin, trade and vernacular name), haits, external morphology, distribution, stem structure (construction of vascular bundles, frequency of component elements, fiber length and width of wood and bark), stem properties (density, shrinkage, mechanics, drying, durability and processing) and utilization etc. The database can be questioned from many different view points, for example (i) which species are known to be used for a particular purpose? (ii) what are the known uses for a particular use have in common? (iv) which other species in database have similar suites of characters and could be put to similar uses? (v) which species in the database have similar characters to those in an unknown rattan samples.
- (3) Edit, publish and disseminate a treatise on stem structure, properties and utilization of rattan imported from Southeast Asia and West Africa (in English).

#### 4. ACTIVITIES

- 1) Collection of rattan specimens and scientific data in South China, Indonesia, Malaysia, the Philippines and Nigeria and Ghana.
- 2) Arrangement of visits to Royal Kew Botanic Gardens in England, Rijksherarium at Leiden University in The Netherlands and Institute of Wood Biology, Hamburg University in Germany to collect specimens and information of rattans which were studied by other scientists previously.
- 3) Laboratory works to be undertaken in the Institute of Botany, Chinese Academy of Sciences including:  
Preparation and examination of samples  
Description of structural features  
Investigation of physical and chemical properties
- 4) Translation of:  
Latin and trade names of rattan species to English and Chinese  
Relevant information written in other languages to English and Chinese

- 5) Editing and data-sorting  
Compiling a treatise on stem structure properties and utilization of rattans imported from Southeast Asia and West Africa.  
Establishing a database software.

## 5. INPUT

### 1) Input by China

The Institute of Botany, Chinese Academy of Sciences will provide the project with four researchers (2 research fellows, 1 engineer, 1 research assistant). In addition, 2 experts who had long experience in rattan taxonomy and wood science will participate in as consultants.

A well-equipped laboratory of two rooms will be allocated with instruments such as sliding microtomes, knives and knife-sharpeners, microscopes, mechanical testing machines and computers.

If the project is approved, the Science Foundation of China will also donate funds for the administrative expenses and purchasing new instrument, such as camera-drawing instrument, the tissue-image processing and analysis system.

### 2) Input by ITTO

Expenses for collection of rattan specimens in South China, Southeast Asia and West Africa.

Expenses for purchase and transportation of specimens.

Expenses for the collection of scientific data in Europe

Expenses for the investigation of structural and mechanical properties

Expenses for the compilation of research report which includes editing, paper, printing and mailing of the treatise.

## 6. INSTITUTIONAL FRAMEWORK

Chinese Academy of Sciences (CAS, or Academia Sinica) is the largest and highest ranked academic research unit directly under the State Council of China. It consists of over 100 institutes and research centers of natural sciences including several botanical institutes, of which Institute of Botany at Beijing is the best and leading institute in the field of life sciences. The Institute is composed of nine departments and a botanic garden which has a total staff of nearly 700 employees. It has the largest botanic library in the country with self-owned stocking over 460,000 books, journals and magazines. The herbarium has the largest collection in Asia with over 1.9 million plant specimens. In addition, more than 5,000 living plants has been introduced to the botanical garden. The institute endeavours both in theory and practice, a wide range of research activities such as plant taxonomy, anatomy, utilization, biochemistry, physiology and ecology.

The research group including four research scientists (two research fellows, one research engineer and one research assistant) from the Institute has completed several research projects granted by the National Natural Science Foundation of China and Chinese Academy of Sciences, two of which were awarded medals for their outstanding research achievements. Surely, the institute is fully capable of completing the tasks mentioned in the proposal.

### The Terms of Reference for the Research Scientists

#### 1) Project Manager

- a) Administers all the activities of the project according to the set objective.
- b) Takes the responsibility for day-to-day running of the project.
- c) Coordinates in the production of output and progress reports of the project.

#### 2) Assistant Project Manager

- a) Assists the project manager in the coordination project activities.
- b) Develops and maintains records of data and information accumulated by the project.
- c) Prepares preliminary reports for project manager's review.
- d) Makes a general guidance about laboratory works and participate in a part of research works.

#### 3) Research Engineer

- a) Develops procedures of laboratory works.
- b) Undertakes the preparation and examination of samples.
- c) Undertakes investigation in physical and chemical properties.

- 4) Research Assistant
  - a) Assists the research engineer in conducting laboratory works.
  - b) Takes the responsibility for day-to-day running of the laboratory.
- 5) Research Consultants
  - a) Assist to guide the research staff in making better research procedures.
  - b) Assist to review the research reports.

### **PART III. SCHEDULES OF MONITORING, EVALUATION AND REPORTS**

#### **1. TECHNICAL REVIEWS**

The project will be subject to periodic technical review in accordance with ITTO's rules and procedures for implementing the plan of the project.

#### **2. EVALUATION**

The project will be subject to evaluation in accordance with the policies and procedures of ITTO. The organization, scope of investigations and timing of the evaluation will be decided in consultations between ITTO and the implementing agencies (Institute of Botany, Chinese Academy of Sciences).

#### **3. PROGRESS REPORTS AND FINAL REPORT**

- 1) Progress reports will be annually presented in English
- 2) The final report will be presented upon the completion of the project in English, French, Spanish and Chinese.

PART IV. BUDGET

I. CONTRIBUTION BY CHINESE GOVERNMENT

Salaries for 4 Scientists	18,000.00
Instruments	
Sliding microtomes	7,000.00
Knives and shapeeners	3,000.00
Computers	3,000.00
Microscopes	4,000.00
Physical testing equipment	5,000.00
Science Foundation (as a donor)	16,000.00
<b>Total In-kind Contribution</b>	<b>56,000.00</b>

II. CONTRIBUTION BY ITTO

30. DUTY TRAVEL

31. To Southeast Asia	16,000.00
To West Africa	14,000.00
To Europe	11,000.00
39. Component Total	41,000.00

50. CONSUMABLE ITEMS

53. Sample expenses & freight	3,000.00
55. Experiment-Related Items	
Sample slicing	6,000.00
Structural description	4,000.00
Testing of physical properties	8,000.00
Testing of chemical propoerties	6,000.00
59. Component Total	27,000.00

60. MISCELLANEOUS

61. Print and distribution of Reports	8,000.00
62. Sundry	4,000.00
69. Component Total	12,000.00

70. ITTO MONITORING, EVALUATION AND ADMINISTRATION

71. ITTO monitoring and evaluation	4,000.00
72. ITTO administrative service charge	4,620.00
79. Component Total	8,620.00

99. GRAND TOTAL

88,620.00

**APPENDIX 1. Work Plan**

---

Items	'96	'97	'98	'99
	1234	1234	1234	12
1. Collecting data & rattan specimens	-----			
2. Making Experiments		-----		
3. Writing Final Report				-----
4. Translating, printing & disseminating the research reports				-----