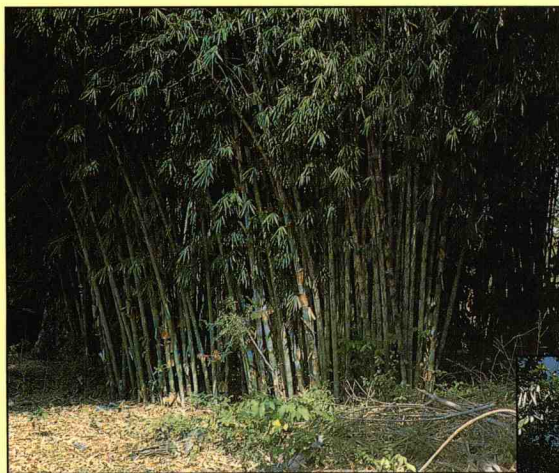
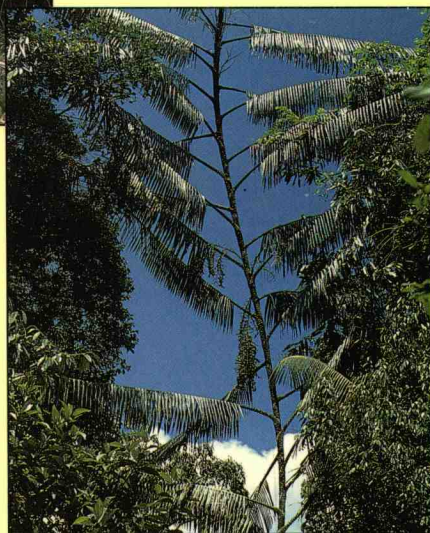


THE IDRC BAMBOO AND RATTAN RESEARCH NETWORK IN ASIA



BAMBOO



RATTAN



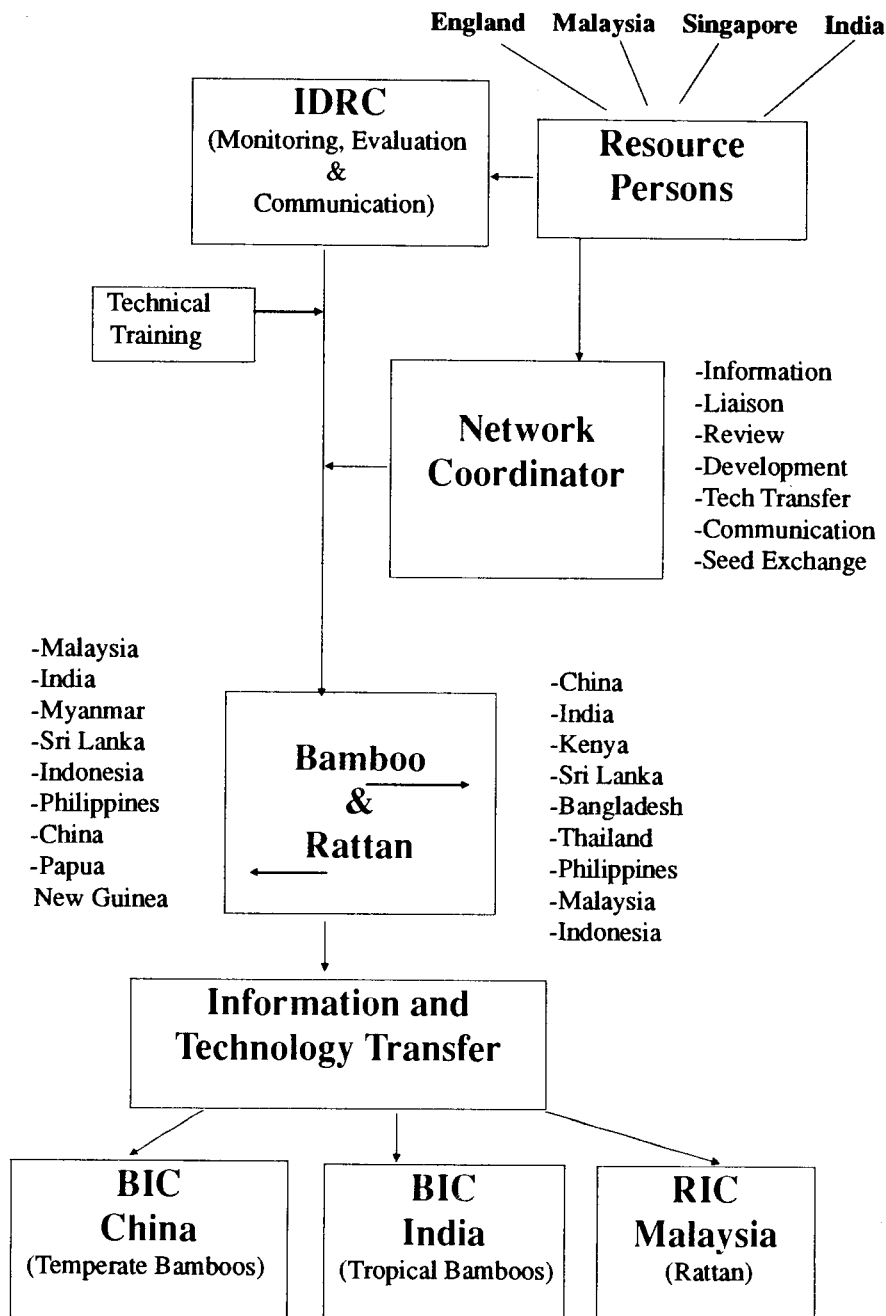
CANADA

**Conservation
Propagation
Plantation
Utilization
Manpower
Development**

ARCHIV
SASTRY
no. 4

The IDRC Bamboo and Rattan Research Network

THE IDRC BAMBOO AND RATTAN RESEARCH NETWORK

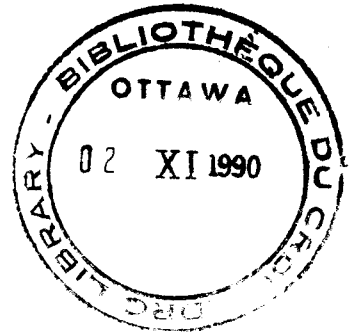


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SASTRY
no 4

Published by The IDRC Bamboo and Rattan Research Network
I.V. Ramanuja Rao and Cherla B. Sastry
February 1990



THE IDRC BAMBOO AND RATTAN RESEARCH NETWORK IN ASIA

This pamphlet provides some important information on bamboo and rattan research supported by IDRC during the last 10 years in various Asian countries.

BACKGROUND

The forestry program of the IDRC has the following main objectives:

- *To concentrate on integrated or social forestry rather than industrial forestry development.*
- *To allocate resources to four major research fields: integrated forest production systems, fuelwood and energy applications, management and regeneration of natural forests and forest product utilization.*
- *To seek solutions to existing problems, within these fields, by developing low cost, applied research methodologies and low input technologies.*

To achieve the above objectives, the program is divided into five sub-programs: Forest Management and Production, Integrated Production Systems, Forest Product Utilization, Fuelwood and Energy. In the Asian sector of the Centre's operations, emphasis has been given to research on bamboo and rattan species.

Over the years, dating back to historical times, bamboo and rattan have been an integral part of life in South and S.E. Asia. Even today, these two groups of plants play an important role in the culture and economies of the rural people of the region. However, there are dangerous signs that the resources of bamboo and rattan are being rapidly depleted. Research is urgently needed to arrest what appears to be a deteriorating situation which could negatively impact on the lives of some of the world's least advantaged people. The IDRC-supported network projects are meant to address this situation.

EVOLUTION OF THE NETWORK

Unlike the typical development of networked research, the IDRC-supported Asian Bamboo-Rattan Network evolved gradually over the last ten years to its present status. Early in 1979 the IDRC called a small meeting of interested parties in Singapore to identify

the issues pertaining to rattan research. The year following a similar meeting was organised for bamboo. The outcome of these meetings resulted in a research agenda for the region. Under this framework individuals and institutions in the region were encouraged to develop research projects which on peer review and recommendations received IDRC funding. Between 1980-1989 a total of 19 projects from 9 Asian countries were brought in. Today, there are well over 60 scientists working on about 50 different studies concerning bamboo and rattan. These activities are located in Bangladesh, China, India, Indonesia, Malaysia, the Philippines, Sri Lanka and Thailand. In 1988, Papua New Guinea joined the group and in 1990 it is hoped that Myanmar will become a participant.

IMPORTANCE OF BAMBOO

Some 1,800 years ago an Asian described the bamboo as an essential ingredient for a serene and contented life; more recently others have called it "the poor man's timber", "the miracle grass" and "a cradle to coffin timber". In South, South-East and Far East Asia the bamboo is used for housing, construction, scaffolding, piping, ladders, mats, blinds, tool handles, toys, musical instruments, furniture, handicrafts, containers, cooking vessels, pulp and paper, food, fodder and fuelwood. It is truly a multipurpose (grass) species and well justifies the sentiment that at least a third of humanity uses bamboo in one form or another during their lifetime. The giant grass is also becoming popular in other parts of the world for similar reasons and additional ones like ornamentals. In parts of India and China bamboo is being used for rehabilitating degraded and mined lands. Bamboo binds the soil preventing erosion and loss and is very versatile growing on a variety of soils, which are poor in mineral and nutrient contents. The fast growth rate of bamboo is well known and many varieties are available that are suitable for semi-arid and humid conditions.

In socio-economic terms bamboo forests contribute enormously to the region's national and individual wealth. The plant is said to house tens of millions in Bangladesh, India, Myanmar, Thailand, the Philippines and Indonesia.

IMPORTANCE OF RATTAN

Rattan in South East Asia is rated as the most important non-timber forest product. Yet, until recently this group of plants received but benign attention from all but a dedicated cohort of enthusiasts. The situation has since changed rather dramatically. Almost all of the countries in the region have taken steps to protect their resources by banning exports of raw and semi-processed cane, by setting regulations on harvesting and by conserving their wild gene pool. This turn around is not surprising for the rattan has so much to give to the communities around it.

In socio-economic terms, the rattan palms continue to be part and parcel of the rural industries of S.E. Asia. The palms also support a manufacturing activity that is labour intensive requiring a per capita worker investment of less than USD 2000/- and contributing to a world trade of no less than USD 2.0 billion per year. Rattan products are fashion proof and have become extremely popular as furniture in affluent societies. In parts of the Philippines, Indonesia and Thailand, entire villages are dependent on rattans for hard cash

and conservatively, some 100,000 workers around the region earn their livelihood in rattan-based furniture industries.

MAJOR OBJECTIVES OF THE NETWORK

Each participant within the network is encouraged to initiate studies relevant to their local environment, within a broadly framed reference. These broad objectives are:

- *To select, conserve and genetically improve species or varieties that are presently utilized and those that possess the potential.*
- *To develop seed collection, storage and germination techniques.*
- *To develop appropriate propagation, nursery and transplanting techniques; both in vivo and in vitro methods are included.*
- *To develop sound management systems for the maintenance of natural stands and plantation cultivation of bamboos and rattans.*
- *To study the morphology, anatomy, and physical, mechanical and chemical properties of new (unknown) species and old (known) species following silvicultural treatments.*
- *To determine the socio-economics and environmental aspects of bamboo and rattan forestry.*
- *To facilitate institutional support (like training, study tours, workshops).*
- *To collect, publish and exchange information (information centres, newsletters, seminar and conference proceedings).*

PARTICIPATION IN THE NETWORK

Direct participation in network activity is limited to successful applicants of R & D grants from IDRC. These are listed below. However, indirect participation (e.g. conferences, seminars, consultancies) by individuals and organisations has been encouraged and supported.

CURRENT STATE OF RESEARCH

In its ten years of existence the network has grown both in strength and output. Some notable highlights are:

- *Six rattan and six bamboo living gardens have been established in the participating countries. In these gardens some 115 species of rattans and 407 species of bamboo are being grown, their phenology is kept under observation, and their usefulness demonstrated in training activities.*
- *Techniques are being investigated for cultivating and managing most species of bamboo and rattan that are currently used.*
- *Suitable tissue culture techniques are being developed for the propagation of bamboo and rattan.*

- *Data is being collected on the ecophysiological needs of C.tetradactylus, C. perigrinus and D. margaritae.*
- *The morphology, anatomy, and physical, chemical and mechanical properties of a number of bamboo and rattan species are being determined.*
- *Techniques to preserve bamboos and standards for grading rattan are being developed.*
- *More than 60 Asian scientists and technicians have been trained in bamboo farming and the production of rattan and bamboo furniture.*
- *The Rattan Information Centre has been established and besides collecting, cataloging, storing and retrieving all literature on rattan it also runs a free enquiry service on all aspects of rattan production and utilization. A quarterly bulletin is also being produced.*
- *More recently a Bamboo Information Centre has been set up in China. Its function is similar to the Rattan Information Centre. Another Bamboo Information Centre is being established at KFRI, India.*
- *The following meetings and workshops have been organized:*
 - 1979 - Rattan Workshop (Singapore)*
 - 1980 - Bamboo Workshop (Singapore)*
 - 1984 - Regional Rattan Seminar (Malaysia)*
 - 1985 - Regional Bamboo Workshop (China)*
 - 1985 - National Meeting on Bamboos (Thailand)*
 - 1985 - National Meeting on Rattans (Indonesia)*
 - 1986 - National Seminar on Rattans (Thailand)*
 - 1987 - Colloquium on Rattan Propagation (Malaysia)*
 - 1987 - Regional Seminar on Tissue Culture of Forest Species (Malaysia)*
 - 1987 - Regional Rattan Seminar (Thailand)*
 - 1988 - National Meeting on Rattans (Philippines)*
 - 1988 - Regional Workshop on Bamboos (India)*
 - 1988 - Regional Training Program for Rattan/Bamboo Furniture Industry in Asia and the South Pacific (with FAO/UNIDO)*
 - 1988 - National Meeting on Bamboos (Thailand)*

PROJECTS

Bamboo (Bangladesh)
IDRC Grant: \$328,165 CAD

Project Leader : Director
Forest Research Institute

This project was started in 1984 with the main objective of training the staff to undertake research in Bangladesh. Two research officers were trained abroad and two others within the country. At present all of them are working at the Forest Research Institute. Several varieties of four high yielding bamboo species have been released for cultivation after determining their suitability in the forest research stations. New methods for vegetative propagation of two bamboo species by branch cutting have been established and the details publicised for the benefit of growers. The tissue culture techniques

developed have also been popularised among the select group of people who can adopt this method for their practical benefit.

Bamboo (China)
IDRC Grant: \$586,867 CAD

Project Leader : Mr Fu Maoyi

China has a rich and long tradition of cultivating and utilizing bamboos. However, current production levels are able to meet only half of the country's needs. The main objective of the project is to develop an intensive cultivation of bamboo and extend the bamboo growing areas into northern colder climates by developing cold-resistant varieties to meet the increased needs.

Fertilizer trials on levels and methods of application have been co-ordinated using compound (NPK) inorganic fertilizers on *Phyllostachys pubescens*. The recycling of nutrients within a bamboo forest is also being worked out. The bamboosetum in Anji county now contains about 250 species of Chinese bamboos. Of these, 31 are being closely monitored for phenological developments. Studies are also underway on the biodeterioration and preservation of bamboo timbers. The timber and shoot properties of bamboo as affected by fertilizer treatment are being determined. The cold resistance of a selected group of bamboos is also being determined for future trials.

The improved cultivation techniques developed will be disseminated to managers and technicians in three important bamboo-growing provinces. A survey of existing practices and beliefs about bamboo cultivation will be carried out and economic data on bamboo production collected.

Bamboo Information Centre
(China)

Project Leader : Dr Zhu Shilin

IDRC Grant: \$154,300 CAD

China has a history of more than three thousand years in the cultivation and utilisation of bamboos. Most of their experiences and research results are published in Chinese except for two periodicals in English. The Bamboo Information Centre was established in 1987 to disseminate relevant information to the members in other countries who are interested in bamboo research and cultivation. Two publications have already come out, one with 150 abstracts and the other with 600 references. This project is of considerable importance in providing technical assistance among the developing countries and strengthening the bamboo research activities in the region.

Rattan (China)
IDRC Grant: \$226,600 CAD

Project Leader : Mr Xu Huangcan

The main objective of the project is to identify suitable rattan species of good quality and develop technology for their large-scale cultivation.

China has a rattan-based cottage and furniture making industry employing some 70,000 people mostly in the South. This activity which needs about 30,000 tons of cane annually is dependent on imports for two thirds of its needs. This dependency is expected to increase for two major reasons viz. an increased demand for raw cane and the diminishing local supply. *Calamus haniensis*, the popular local cane, is on the verge of extinction.

Through this grant scientists at the Tropical Forest Research Institute, Guangdong have completed a taxonomic inventory of the rattan flora of the Southern Provinces (Hainan, Fujian, Guangdong, Jiangxi and Guangxi). The inventory should unearth potential usable species. The properties i.e., chemical, physical and mechanical of the little known species are also being studied. A living rattan garden has also been established on Hainan island. Some 30 species of local and exotic canes have been planted in this garden and the phenology of a few selected species is being kept under observation. Plantation trials are also underway to test out various prescriptions for intercropping rattan species like *Calamus tetradactylus*, *Daemonorops margaritae* with timber species such as *Pinus*, *Michaelia*, rubber etc. Group planting, and the effect of shade, spacing and fertilizers are also being studied. Laboratory studies are also underway to determine the (micro) nutritional and climatic needs of rattan seedlings.

Bamboo (India)

IDRC Grant: \$137,000 CAD

Project Leader : Dr K.S.S. Nair

Coordinator : Dr R. Gnanaharan

The bamboo research project submitted by Kerala Forest Research Institute was approved for funding by IDRC in 1987. The ongoing research includes the following:

1. To develop and standardise propagation techniques (vegetative and generative); based on these experiences a workable model will be developed for the use of growers and planters.
2. To develop agro-forestry research models and the use of bamboo for conservation of soil.
3. To improve bamboo resources for the use of farmers and cottage industries. To increase the bamboo resource base in Kerala, about 30 more species will be introduced from similar agro-climatic regions of India. Both vegetative and seed materials will be used. These newly introduced species are likely to flower and fruit at different periods and it is hoped that by using the seeds the planting operations will be successively continued.

**Bamboo Information Centre
(India)**

IDRC Grant: \$119,000 CAD

Project Leader : Mr K. Ravindran

Bamboo is becoming an increasingly scarce and expensive commodity in India. An effort is therefore being made in several centres to research into techniques which will boost bamboo production. To support this research, a Bamboo Information Centre (BIC) is being established at the Kerala Forest Research Institute to provide support to both research and extension organizations. BIC will create an integrated bibliographic and research database, and produce extension bulletins and slide sets for popularizing improved production and preservation techniques.

Bamboo Mat Board (India)
IDRC Grant: \$145,150 CAD

Project Leader : Dr P.M. Ganapathy

Bamboo mat wearing is a very old and popular vocation in most parts of Asia, with millions of square metres of mats being produced in the rural areas. The general objective of this project is to develop appropriate technologies for the production of good quality, low-priced bamboo mat boards using woven bamboo mats. This will not only increase the income of the bamboo mat weavers but will also reduce dependence on imported wood for plywood production. Low-cost/low-input technologies using local raw materials

(bamboo) and adhesives based mostly on industrial waste (black liquor) will be developed at the Indian Plywood Industries Research Institute for the production of commercial bamboo mat boards.

Rattan (India)

Project Leader : Dr K.S.S. Nair

IDRC Grant: \$163,000 CAD

Coordinator : Dr K.M. Bhat

This project was started with IDRC funding at the Kerala Forest Research Institute. The objectives are as follows:

1. To conduct an intensive survey of the western ghats to establish the extent of rattan resources available.
2. To develop appropriate vegetative and generative propagation methods and planting techniques.
3. To develop new implements to improve the harvesting methods for achieving higher productivity.
4. To determine the physical and mechanical properties of local canes.
5. To conduct a short term training course for the benefit of rattan workers both in the laboratory and the field.

Bamboo (Indonesia)

Project Leader : Dr Achmad Sulthoni

IDRC Grant: \$84,500 CAD

The main objective of the project was to develop improved and inexpensive preservation methods to extend the durability of bamboo products.

Bamboo is highly susceptible to attack and degradation by insects, fungi and bacteria. Starch or the abundance of it seems to be the critical factor in this vulnerability. In rural Indonesia, bamboo is an important construction material and in order to lengthen the service life of the timber, the village people immerse green bamboos under running water for up to a month before use. A considerable amount of starch is leached out of the bamboo - however, this is not sufficient to significantly improve its service life.

In this project Dr Sulthoni and his team from the Faculty of Forestry, Gadjah Mada University have not only clarified the situation in relation to traditional practise but also explored ways and means of developing simple technologies using chemical preservatives available in the Indonesian market. Work to date has included studies on the mechanical and physical properties of young and old culms of treated and untreated bamboos and the applications of CuSO₄, diesel oil and borax through hot and cold soaking methods and modified Boucherie. Three species of bamboos viz. *Bambusa vulgaris*, *Gigantochloa verticillata* and *Dendrocalamus asper* have been studied.

The result of this study will not only help in lengthening the service life of bamboos in housing and other construction but also in preventing the rapid depletion of the resource.

Rattan (Indonesia)

Project Leader : Mr Wartano Kadri

IDRC Grant: \$396,470 CAD

Coordinators : Dr Toga Silitonga

Dr Sutjipto A.Hadikusumo

The Republic of Indonesia produces and exports about 80% of the world's raw and more recently, processed rattan. The country has more than 9 x 10⁶ ha. of natural rattan forests and several hundred hectares of plantations. At least 250,000 Indonesians are

employed in rattan-related vocations. This rich resource has to be carefully nurtured and improved if the country is to derive sustained benefits in perpetuity from it. Part of this nurturing process involves conservation, development of plantation technologies and efficient utilization of all the rattan resources.

The main objective of this project is to develop methods for improving and increasing the production of native rattan species. A living conservation garden has been established near Bogor and nearly 35 species of Indonesian rattans are being grown there. In the next three years a further 40 species will be added to this collection. An extended survey of the rattan resource will also be carried out with assistance from Herbarium Bogoriense.

Silvicultural studies are underway to determine optimum conditions for growing *Calamus manan*, *C.inops*, *C.robusta*, *C.scipionum* and *Daemonorops melanochets*. The physico-mechanical properties of nine canes have been determined. This study will be further extended. A mechanical device for harvesting cane has been designed and fabricated. This is called a tirfor and is presently undergoing field trials. Post-harvest treatments for increasing the durability of rattans without loss of aesthetic quality are also being experimented upon. A site-specific study on the economics of rattan plantation and trade in East Kalimantan has been completed and a broader cost and benefit study initiated. The impact of the new export regulations on the trade and people employed in it will also be determined.

Bamboo (Kenya)

Project Leader : Dr Bernard Kigomo

IDRC Grant: \$90,800 CAD

The network is pleased to include the Kenya Forest Research Institute into its fold. Though the project was approved for implementation in March, 1987, work could not be started till September and exploratory visits to fields were made in November, 1987. The main objectives of the project include

1. the identification of Asian and African species suitable for introduction into Kenya,
2. developing satisfactory nursery techniques for the mass propagation of superior plants,
3. comparing the growth of selected species in different agroclimatic zones and
4. to investigate the economics of bamboo cultivation, processing and marketing in Kenya.

Bamboo(Malaysia)

Project Leader : Dr Salleh Mohd Nor

IDRC Grant: \$170,000 CAD

Coordinator : Dr Wan Razali

Bamboo is a common plant in most parts of Malaysia. Even though rural Malaysians have a long tradition of using bamboos in their daily life, not much attention has been given till very recently to bamboo forestry. There is now an awareness of the enormous potential bamboo has in the economy of rural areas and research is being undertaken not only to increase production but also utilization in innovative ways.

In keeping with the project's objectives, scientists at the Forest Research Institute Malaysia are currently evaluating the performance of *Thyrsostachys siamensis* and *Gigantochloa scortechnii* in natural groves. They are also determining silvicultural prescriptions for *G.scortechnii*. Bamboo culms are being tested as reinforcers of soil in new road construction work. This innovative application of bamboo culms is being monitored with highly sensitive stress and strength measuring equipment and follow up studies are being conducted in the laboratory under controlled conditions.

Rattan (Malaysia)**IDRC Grant: \$366,690 CAD****Project Leader : Dr Salleh Mohd Nor****Coordinator : Dr Wan Razali**

There are some 104 species of rattan in Malaysia. Of these about a dozen are commercially valuable and have been subjected to heavy exploitation pressure including indiscriminate removal of seed plants. This has resulted in a severe shortage of planting stock for regeneration purposes. An alternative to meeting the needs for seedling supply is the developing of a mass propagation technology based on tissue culture.

Researchers at the Forest Research Institute Malaysia have established a tissue culture laboratory and developed techniques for the mass propagation of commercially important rattan species. This propagation technology is now ready for both mass production and extensive field trials. Scientists and extension workers will disseminate rattan plantation technologies based on mass-propagated seedlings, and mount programs for the transfer of the technology. They will also analyze the cost and benefits of the undertaking. Further, to conserve the gene pool for future improvement of yields, seed orchards in selected environments will be located and protected. A small rattan seed centre will be established for storage and exchange of seed material from superior plants with interested groups from within and outside the country.

**Rattan Information Centre
(Malaysia)****IDRC Grant: \$157,145 CAD****Project Leader : Mrs Kong How Kooi**

The Rattan Information Centre (RIC) was established in 1983 and during the Phase I of three years many of the objectives set out were well accomplished including the publication of a newsletter and establishing of contacts between researchers and entrepreneurs in the region. Phase II which is in progress is designed to publish

- a) a new series of "How to do" booklets, RIC newsletter, occasional papers;
- b) establish a micro-computer based information storage and retrieval system and
- c) an arboretum.

The proceedings of a round table workshop on rattan, held during 1987, in Kota Kinabalu, Sabah, Malaysia are already published.

Rattan (Papua New Guinea)**IDRC Grant: \$188,200 CAD****Project Leaders: Dr Simon Saulei****Prof Robert Johns**

Outside Indonesia (world's biggest rattan exporting country) and to some extent Malaysia, raw or unprocessed rattan is getting relatively scarce due to export restrictions imposed by the governments to protect their own home industries. New resource centres are being sought in the neighbouring countries to ensure the continuous supply of raw materials needed to support the industries in other countries. Papua New Guinea (PNG) has considerable natural stock of rattan which can be developed as a good renewable resource. This project is formulated to obtain quantitative, qualitative, technical and economic data on rattan in PNG which would help to establish the industries. To conserve the gene pool material, a rattan arboretum is being established and stock plants in other centres will ensure a continuous supply of new planting materials. This study is recognised as a high priority subject since it promises to provide self-employment in the rattan-rich rural communities.

Bamboo (Philippines)
IDRC Grant: \$74,700 CAD

Project Leader : Dr Alfinetta B. Zamora

The main objective of the study is to develop tissue culture techniques for the mass-propagation of important bamboo species.

In the Philippines as in most other S.E. Asian countries, bamboos are an important group of plants providing food, constructional material and employment for thousands of rural dwellers. In recent years, there has been an increase in the rate of exploitation while the rate of regeneration has not kept pace. There is an urgent need to develop methods for the mass-propagation of bamboos.

The project team under Dr Zamora of the Institute of Plant Breeding has been developing tissue culture techniques for *Dendrocalamus latiflorus*. The techniques tried out use tissues from nodes, internodes and rhizomes.

Rattan (Philippines)
IDRC Grant: \$379,290 CAD

Project Leaders: Dr F.Pollisco
Dr F.Tesoro
Dr V. Fernandez
Coordinator: Dr Justo Rojo

The major objective of this project is to increase the knowledge of Philippine rattans (abundance and distribution), develop techniques for propagation and nursery care and improve equipment used for processing cane.

The furniture making industry in the Philippines which is mostly dependent on rattans, fears collapse for want of sustained supply. This will not only hurt the industry but also bring untold hardship to thousands of Philipinos who depend on rattans for employment. Therefore, there is urgent need to develop plantation technologies for rattan, for discovering newer sources of supply and to improve harvesting and utilization efficiencies.

Three teams of researchers drawn from the Faculty of Forestry UPLB, Ecosystems Research and Development Bureau and the Forest Products Research and Development Institute under the management of the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCAFNRRD) have been engaged in plantation trials using seedlings propagated by a variety of vegetative and non-vegetative methods. Work has also been carried out on the improvement of rattan processing techniques/equipment and a multi-media teaching package is being prepared to disseminate the research findings. Five species of rattans viz. *Calamus merrillii* (Palasan), *C.caesius* (Sika), *C.filispadix* (Tagiktik), *C.ramolusus* (Panlis) and *Daemonorops mollis* (Ditaan) are currently under cultivation.

Bamboo/Rattan (Sri Lanka)
IDRC Grant: \$263,300 CAD

Project Leader : Dr K.Vivekanandan

This project was started in 1984 to develop the necessary methods for the propagation of most species and clones of bamboo and rattan in Sri Lanka. A small scale demonstration farm was established for the benefit of growers in different parts of the country. The taxonomy, phenology and distribution of the Sri Lankan species were studied and live collections established with local and introduced bamboos and rattans. These studies are being extended. In addition, a market and resource survey as well as a socio-economic feasibility study of the technologies developed are being carried out. The results will be

disseminated to the users and recommendations made for a new resource management policy.

Bamboo (Thailand)
IDRC Grant: \$471,300 CAD

Project Leaders: Mr Boonchoob Boontawee
Dr Songkram Thammincha

The long-term objective of the project is to increase the production of bamboos in Thailand.

The bamboo forests of Thailand have suffered extensive and rapid depletion by the rural people in search of food and timber. To counter this, Thai researchers have been working on many aspects of bamboo production for several years now.

Researchers from Kasetsart University and the Royal Forest Department have been involved in working out strategies for the cultivation of bamboos in small farms for both shoot and timber production. Experimental farms have been established in the three climatic zones of Thailand where *Bambusa blumeana*, *B.nana*, *Dendrocalamus asper* and *Thyrsostachys oliveri* are being cultivated. Fertilizer treatments to enhance production and harvesting techniques are also being worked out for these bamboos. Four bamboo living gardens have been established and in each between 20 to 30 temperate and tropical bamboos are being grown as part of a conservation programme. Seed storage studies are in progress and seeds of *Bambusa arundinacea*, *B.nutans*, *Dendrocalamus nutans*, *Gigantochloa albociliata*, and *G. hasskarliana* have been studied for their storage. A manual on Thai bamboos is being prepared. Cost and benefit studies are also being conducted.

Rattan (Thailand)
IDRC Grant: \$357,000 CAD

Project Leaders: Dr Isara Vongkaluang
Mr Boonchoob Boontawee

The long-term objective of the project is to increase the production and improve the utilization of rattans by establishing plantations of valuable species.

Thailand is the second country in Asia that has recently become a net importer of raw cane. Till 1984, its rattan needs were mostly met locally. This is partly due to over exploitation and partly to habitat destruction. Unless something is done to sustain the supply of cane the industry is in danger of collapse leaving perhaps tens of thousands of people without jobs and incomes.

In this project Dr Isara Vongkaluang and his colleagues from the Faculty of Forestry, Kasetsart University and the Royal Forest Department are working on selected Thai rattan species such as *Calamus perigrines*, *C.rudentum*, *C.javensis*, *C.blumei*, *Daemonorops didymophylla*. The ecology and phenology of the above five species is being examined to determine their light requirements. Nutritional and hormonal requirements of *C.longisetus*, *C.caesius* and *C.perigrines* are being worked out. The information being gathered will help in determining pre-planting treatments, an activity seen as crucial in establishing rattan as a plantation crop. A manual of Thai rattans is also under preparation.

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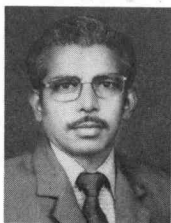
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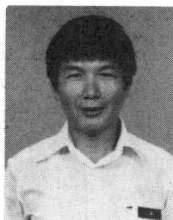
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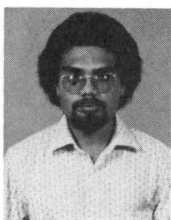
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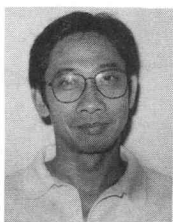
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Other Publications by the IDRC Bamboo and Rattan Research Network

- *Rattan: A Report of a Workshop held in Singapore, pp 76 (1979)**
- *Bamboo Research in Asia, pp 228 (1980)**
- *Proceedings of the Rattan Seminar, pp 247 (1985)*
- *Recent Research on Bamboos, pp 393 (1987)*
- *Proceedings of Colloquium on Rattan Propagation, pp 48 (1987)*
- *The IDRC Bamboo and Rattan Research Network in Asia, pp 20 (1988)*
- *Recent Research on Rattans, pp 275 (1989)*
- *Proceedings of the Seminar on Tissue Culture of Forest Species, pp 215 (1989)*
- *A Guide to the Collection of Bamboo, pp 24 (1989)*
- *Propagation of Bamboo and Rattan Through Tissue Culture, pp 60 (1990)*
- *Proceedings of the International Bamboo Workshop (Cochin) - 1990 (under preparation)*
- *Bamboo - The Miracle Grass - Film/Video*
- *Rattan - Film/Video*

*Out of print

These publications can be obtained from:

International Development Research Centre (IDRC)
 Tanglin P.O. Box 101
 Singapore 9124
 Republic of Singapore

- 1) *Schizostachyum brachycladum*
- 2) *Bambusa blumeana*
- 3) *Bambusa arundinacea*
- 4) *Calamus thwaitesii*
- 5) *C. thwaitesii* - Seedlings
- 6) Splitting of Rattan
- 7) Rattan handmade products

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