

Project : PD 56/99 Rev. 1 (I)
Promotion of the Utilization of Bamboo
from Sustainable Sources in Thailand

**The International Training Workshop on
Bamboo Handicraft Techniques, Its Tools and Small Machines**



Zhejiang, Sichuan of China

8 – 21 October, 2001



Royal Forest Department, Bangkok, Thailand

and

International Tropical Timber Organization (ITTO)





Proceeding No. 1

The International Training Workshop
on
Bamboo Handicraft Techniques, Its Tools
and Small Machines

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WORKSHOP REPORT

on

The International Training Workshop on

Bamboo Handicraft Techniques, Its Tools and Small Machines.

8-21 October 2001, Zhejiang, Sichuan of China.

1. INTRODUCTION

The Thai Participants were sponsored by The International Tropical Timber Organization (ITTO) to attend the International workshop organized by The Ministry of Science and Technology of China (MOST), The International Network of Bamboo and Rattan (INBAR), and The Chinese Academy of Forestry, International Farm Forestry Training Center (INFORTRACE). There were 45 participants. The Thai participants composed of five persons, including the leader, Ms. Wanida Subansenee, the team leader of bamboo project (PD 56/99 Rev. 1(I) : Promotion of the Utilization of Bamboo from Sustainable Sources in Thailand), Ms. Pannee Denrungruang, Ms. Paiwan Lekuthai, Mr. Yanyong Kangkarn, and Mr. Suthep Chiaplaem.

The mission of the participants was to learn about bamboo handicraft techniques, industrial processing technologies, biodiversity and its utilization, marketing of bamboo products, and machines and tools as developed in China. The participants also had a good chance to know and exchange idea with experts and participants from many countries during the workshop which will enable them to successfully conduct the research and development program in Thailand. The workshop program consisted of lectures, field studies and practical training.

2. CONTENTS OF WORKSHOP

2.1 Lecture Programs consisted of :

- 1) General Introductions of Bamboo Development in China by Prof. Zhu Zhaohua

His lecture focused on the history of bamboo in the Chinese culture and its utilization. Chinese people knew how to grow bamboo for more than 3,000 years. At present, the bamboo-growing farmers can earn money about 4 times than the rice-growing farmers, causing the gradually increase of the bamboo-growing areas annually. The Chinese government promoted

farmers to grow bamboo on the log- over areas including the erosion prone areas along the hill slopes for soil conservation as well as for utilization. The monopodial type bamboos were chosen for high and cool mountains, while the sympodial type, as mostly found in Thailand, was chosen for the lowlands or the small farmer's plot. The Chinese bamboos are mostly straight and long internode culm with small branches and leaves easy to manage and transport to the market. At present, China has enough raw material supply from bamboo in the country and can export bamboo products to foreign markets all over the world.

The research and extension of bamboo products and technologies include :-

- Experts in different fields about 200 persons.
- The study on taxonomy, distribution and diversity of bamboos.
- The study on bamboo ecology, physiology and properties.
- The study on pest and disease control.
- The study on high yield bamboo plantation and improvement.
- The study on bamboo processing technologies.
- The study on off-season bamboo shoot production.
- The study on bamboo composite materials and cement board.
- The study on extractive materials from bamboos.
- The study on bamboo charcoal.

The promotion on bamboo production and development of new technologies was performed as a tripartised collaboration by government organization, technician, and business industries by holding a meeting every month. The activities began with the family member grouping to prepare the bulk materials as order by the factories with small hand tools under the guidance of the technician and the financial support of the government. The participated groups will receive soft loan and necessary equipments which they will pay back after the project makes profit. There are some conditions such as training of other interested people by promising to teach the others and if withdrawing from the project, technologies should be transferred to the others. The government will designate the areas, the bamboo species, the management and the production programmer for the participated groups.

2) China's Bamboo Handicraft and Industrial Processing Technologies by Prof. Tang Yongyu

His lecture focused on bamboo products development, i.e. bamboo wearing and painting, bamboo baskets for different styles of utensils,

bamboo mat including lantern and screen products, bamboo parquet and plywood, bamboo concrete, bamboo charcoal and charcoal stick made of bamboo saw dust, particle board, chopsticks and toothpicks.

3) Small Machines for Bamboo by Prof. Liu Zhikun

The lecture focused on the machines such as cutter, splitter, planer, threader for weaving products, etc.

4) Development of Bamboo Sector in Lin'an County and Bamboo Shoot Processing Techniques by Mr. Wang Angus

5) China Bamboo Biodiversity and Its Utilization by Prof. Ma Naixun

The lecture concentrated on the biodiversity of bamboo in China. The most popular species with good quality and potential consisted of :-

- *Phyllostachys heterocycla* var. *pubescens* is widely planted for 2/3 of the country planting areas because of its good quality for many products.
- *Bambusa chungii* is widely planted in the southern part.
- *B. textilis* is also widely planted in the southern part.
- *Dendrocalamus latiflorus* is also planted in the southern part because it can produce high yield of shoot of 70-80 tons/ha/yr.

6) Marketing of Bamboo Products by Dr. Chen Qicai

2.2 Field Studies

The field studies consisted of visits to village and bamboo industries in Zhejiang and Sichuan as follows :-

1) Toothpicks and chopsticks factory at Zhejiang which all the processes used machines, except packaging.

2) Bamboo shoot factory at Lin'an County, Zhejiang. The area of Zhejiang is 748,000 ha. 13.5% are under bamboo plantation and produce 50% of the country bamboo shoot production. The factory demands \approx 50 tons of bamboo shoot per year. The forest area of Zhejiang is 55,000 ha.

3) Bamboo Mat Factory at Zhejiang, where all the processes use machinery.

The process starts from bamboo splitting \rightarrow slicing to thin plate \rightarrow get rid of the nodes and boil in $H_2O : H_2O_2 : Na_4P_2O_7 \cdot 10 H_2O$ 10% at 22-24 $^\circ$ C for 1 hour \rightarrow dry \rightarrow slicing into round or plate shape \rightarrow weaving to form mat, screen, plate or lantern parts etc.

4) Parquet factory at Sichuan. The processes are as follows :-

Splitting bamboo → planing → take off nodes → kiln dry at 9-12% moisture → spreading through urea gluing machine → layering to desired thickness → pressing under steam → grooving and polishing → drying → wrapping → packaging.

5) Bamboo Machinery Factory at Zhejiang—order can be made.

6) Bamboo Handicraft Factory at Zhejiang is the labour and machine made factory.

7) Moganshan Fan Factory of Yihong Handicraft at Zhejiang is the fan factory which export to Japan, Korea, Malaysia and Thailand, etc.

8) Wanda Bamboo Products at Zhejiang, is the lantern parts and furniture factory for home and garden decoration.

9) Bamboo Plywood Factory—using splitted bamboo with glue and high temperature of 140-150°C and 30-35 Pa/cm² pressure. Cut to size, polish and make different products.

10) Visit Bamboo Plantation and Bamboo Museum at Zhejiang and sichuan.

11) Visit small Bamboo Mat factory called “Ma Chong” which produce bamboo pillow, mat, and seating plate, etc.

12) Visit the bamboo rhizome carving activity.

2.3 Practical Training : Weaving Techniques

Mr. Chen Hun Hua and his colleagues are the pioneers on the development of bamboo weaving industry. They taught how to identify the age of bamboo and how to process the raw material for weaving into different products, i.e. hat and basket, furniture, mat, ceramic cover, painting and weaving for pictures, etc. The participants had a chance to practice how to do bamboo weaving.

3. BENEFITS, SUGGESTIONS AND CERTIFICATION

3.1 Benefits from This Mission

1) Promotion and Occupation Development

The bamboo industry development needs collaboration as a Tri-partise system from the government, business and industry, and the farmer to research, develop, manage and market the whole bamboo industry to achieve the sustainable development.

2) China has enough raw material with rich bio-diversity. There are about 107

species of bamboos all over the world with more than 1,300 subspecies. China has 39 species and more than 500 subspecies and with continuous genetic improvement program.

China has 200 subspecies that produce bamboo shoot for 1.7 million tons/year, the popular species are :-

- *Phyllostachys heterocycla* var. *pubescens* (Moso bamboo) is widely planted up to 2/3 of the total bamboo planting areas, producing 39.5 tons/ha/yr.
- *P. praecox* produces bamboo shoot 30-40 tons/ha/yr.
- *Dendrocalamus latiflorus* produces bamboo shoot about 70-80 tons/ha/yr.

The culm producing bamboo with high yield which are popular consisted of :-

- *P. heterocycla* var. *pubescens* produces culm 30-40 tons/ha/yr.
- *Bambusa chungii* produces culm 60-80 tons/ha/yr.
- *B. textilis*, *D. membranaceus* produce culm 40-50 tons/ha/yr.

The bamboo species for soil conservation and environmental purpose are :-

- *P. heterocycla* var. *pubescens*
- *B. textilis*
- *D. membranaceus*

3) Bamboo Harvesting

The cutting and harvesting techniques have effects on yield and quality. The 1 year old culm is suitable for fine weaving, while the 2-3 year-old culm is suitable for making basket, the 2-5 year-old culm for general products. Generally, it is recommended to harvest 1/4 to 1/5 of the number of culms to enhance new shoots, and if not harvest the yield will decline.

The 3-5 year-old culm usually offer best quality. It is suggested to first harvest after 5 years of planting, and the dry season is the suitable harvesting period because the bamboo will not produce new shoot and the carbohydrate and sugar content are minimal, insects and fungi will not attack.

4) Bamboo Utilization

Bamboo industries in China consisted of :-

- (a) Large scale industries, i. e. parquet, flooring, paper and plywood.
- (b) Small scale industry using labour and handicraft skill are weaving, carving and furniture.
- (c) The mixture between machine and labour industries are bamboo shoot, machong mat, household mat for industries, primary raw products supply to industries, and other products such as fan, lantern, chopsticks, tooth picks, and etc.
- (d) Food and nutritious products, medicine, drink and charcoal.
- (e) Ecotourism and environmental mitigation.

The bamboo utilization in China is very efficient, since 100% from the root to the tip of the culm are utilized for different purposes.

The fungi mushroom grown in bamboo plantation is very famous as a source of food for restaurant and export, making very high benefit for the country.

China has a good market management, each factory has many groups of farmer association to prepare raw materials, in the vicinity of the factory, saving transportation cost.

3.2 Suggestions

1) Bamboo planting should be promoted by distribute bamboo seedlings free of charge to the farmers. Species selection for different locations and utilization should take into account.

The extension and technology development in a tri-partise system should receive high attention.

Bamboo products can replace the utilization of timber i.e. cement board, plywood, door, furniture, construction frame, supporting pole, etc.

Since bamboo products are environmental friendly and bamboos are short rotation crops which can pay back to the growers in a short period.

2) Training on weaving and furniture from bamboo to the farmers who can use Pai Rai, Pai Ruak and other species which can be grown by themselves. The techniques of bamboo plantation management should be transferred to the farmers to promote their participation and as an additional occupation to raise their incomes.

3) Promote household bamboo industry such as the "Mah-jong mat" from PaiLiang which is not yet develop in Thailand. This kind of mat is one of the good sale products in China and Vietnam.

Pai Liang which is mostly grown in the northeast contains good quality for this purpose similar to the specie used in China.

4) The establishment of bamboo garden to promote ecotourism should be promoted because tourists will become good customers of the local bamboo products and can distribute to other markets.

The bamboo museum should also be established to display bamboo products and the history of bamboo development to disseminate knowledge on bamboo to the public.

The large scale bamboo industry cannot be developed in Thailand because of raw material supply is not enough and irrational management. China spent more than 20 years to develop technologies and products before they are well recognized in the world markets.

In the year 2000, China owned about 4.26 million hectare of bamboo plantation. The Moso bamboo was amounted to 550 million culms, yielded 15.95 million tons, exported to international markets with the value of 650 million U.S.D. The average rate of new bamboo plantation is 50,000 ha./year.

5) It deems necessary for Thailand to promote more research on bamboo, i.e. species collection, propagation techniques, bamboo improvement through breeding, and extension.

6) Bamboo is successfully used for soil conservation and environmental mitigation in China. It is suggested that Thailand promote bamboo planting for erosion control on sloping areas and around farm plots for wind break and household use. The lessons learned from landslide diasters in the past may be used as good example for the extensionists.

7) For Natural bamboo forest in Thailand. It is suggested to introduce sustainable management. Proper harvesting of the culm will enhance the new shoots which will increase productivity for the forest. The left over culms in the forest will lose the quality within 8 years. Thus the bamboo forest area will decrease.

3.3 Certification

Certification of participation on the International Training Workshop on Bamboo Handicraft Techniques, its Tools and Small Machines was given to each attendant after the workshop had been completed.

4. ANNEX

Annex 4.1 List of Persons Contacted

International Network for Bamboo and Rattan (INBAR)

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Annex 4.2 Agenda of the Workshop
International Training Workshop on
Bamboo Handicraft Techniques, Its Tools and Small Machine,
8-21 October 2001, Zhejiang, Sichuan of China

7-8 October

Participants arrives in Xiaoshan Airport of Hangzhou, Workshop staff will be waiting at the airport to pick them up.

9 October

7:00-7:50 Breakfast
 8:00-9:00 Opening Ceremony
 9:00-10:00 An Overview of China's Bamboo Industry Development Prof. Zhu Zhaohua
 10:00-10:15 Coffee Break
 10:15-12:00 China's Bamboo Handicraft and Industrial Processing Technologies
 – Prof. Tang Yongyu
 12:00-13:30 Lunch
 13:30-15:00 Small Machines for Bamboo Processing - Prof. Liu Kekun
 15:00-15:15 Coffee Break
 15:15-16:30 The Development of the Bamboo Sector in Lin'an County and Bamboo Shoot
 Processing Techniques – Mr. Wang Anguo, Senior Engineer
 16:30-17:30 China Bamboo Biodiversity and Its Utilization – Prof. Ma Naixun
 18:00 Dinner

10 October

7:00-8:00 Breakfast
 8:00-9:00 China's Policies and Managing Models in Bamboo Sector – Prof. Zhu Zhaohua
 9:00-10:00 Marketing of Bamboo Products - Dr. Chen Qicai
 10:00-10:15 Coffee Break
 10:15-12:00 Presentations of participants
 12:00-13:30 Lunch
 13:30-15:30 Presentations of participants
 15:30-15:45 Coffee Break
 15:45-17:00 Presentations of participants
 17:00-18:00 Touring on the Qingshan Lake by boat
 18:00-19:00 Dinner

11-13 October

Field visit in Lin'an, Anji and Deqing of Zhejiang Province

11 October

7:00-7:30 Breakfast
 7:30-7:50 Check out and load the luggage on bus
 8:00-10:00 Xinfang Toothpick Factory of Zhoucun Village of Shanggan Township,
 Lin'an County
 10:00-12:00 Qingfeng Bamboo Flooring Factory of Lin' an County
 12:00-13:00 Lunch (in Qingfeng Factory)
 13:00-15:00 Yihua Green Property Co. Ltd.
 – Bamboo Shoot Processing Factory of Lin' an County
 15:00-16:00 Baisha Eco - Village, Linmu Township, Lin' an County
 16:00-17:30 Anji Bamboo and Wooden Product Development Co. Ltd. Bamboo Mat
 Processing Factory
 18:00 Arrive in Anji downtown
 18:30-19:00 Dinner, Stay in Anji for night

12 October

- 7:00-7:50 Breakfast
8:00-10:00 Anji Chunhui Bamboo and Wooden Co. Ltd. – Bamboo Handicraft Factory
10:00-12:00 Anji Xiangling Bamboo and Wood Machinery Co., Ltd. Bamboo Processing Machine Factory
12:00-13:30 Lunch
13:30-14:30 The Development of Anji's Bamboo Sector - Mr. Chen Jiageng
14:30-17:30 Anji Bamboo Arboretum and Bamboo Museum
17:30-18:00 Anji Bamboo Art Shop
18:00-19:00 Dinner, Stay in Anji for night

13 October

- 7:00-7:40 Breakfast
7:40-8:00 Check out, load the luggage on bus
8:00-9:30 Anji – Deqing, by bus
9:30-11:30 Moganshan Fan Factory of Yihong Handicraft Co., Ltd. in Deqing County
11:00-11:30 Arrive in Deqing Downtown
12:00-13:30 Lunch
13:30-15:00 Moganshan Bamboo Veneer Board Factory
15:00-17:00 Wanda Bamboo Products Co., Ltd.
– Bamboo gardening and landscape products
Morning Hangzhou – Chengdu (Capital of Sichuan Province), by air

14 October

- 14:00 Meet at the Airport
14:00-15:00 Airport - Meishan Yinpeng Hotel
15:30-16:00 Meishan - Qingshen Bamboo Handicraft City
16:00-16:30 Welcome Ceremony
16:30-18:30 Visit the Bamboo Weaving Museum and Single Bamboo Boating Performance
18:30-19:30 Dinner (in the Bamboo Handicraft City)
19:30-20:00 Qingshen - Meishan Yinpeng Hotel

15 October

- 08:00-08:30 Meishan Yinpeng Hotel - Qingshen Bamboo Handicraft City
08:30-10:00 History of China's Bamboo Handicraft, Selection of Bamboo Species and Bamboo Harvesting Techniques (bamboo age and cutting time, etc.) for Handicrafts – Master Chen Yunhua
10:00-10:15 Coffee Break
10:15-12:00 Bamboo Handicraft Processing Technologies: Disease and Pest Control, Dyeing and Bleaching; Necessary Tools for Different Products; Managing Model of Enterprises (Enterprises + Rural Households) – Master Chen Yunhua
12:00-13:00 Lunch
13:00-17:30 Demonstration and Practice for making bamboo tables and chairs, baskets, bamboo coat for china vases, bamboo curtains, hats, bamboo woven drawings
18:00-19:00 Dinner
19:00-20:30 Party with local artisans
20:30-21:00 Qingshen - Meishan Yinpeng Hotel

16 October

- 07:00-08:00 Breakfast
08:00-09:00 Meishan - Leshan, by bus
09:00-11:00 Leshan Grand Buddha (the Largest Buddha in the World)
11:00-12:00 Leshan - Qingshen
12:00-14:00 Lunch
14:00-15:00 Xilong Bamboo Pulp Factory (copy paper and publications)

15:00-17:00 Village bamboo weaving in the South of the City
18:00-19:00 Dinner at the Garden of Flowers and Fruits (Huaguoyuan)
19:00-19:30 Qingshen - Meishan Yinpeng Hotel

17 October

06:30-07:00 Breakfast
07:00-7:10 Check out, load the luggage on bus
07:10-13:00 Meishan - Changning County (360 Kilometers, 6 hours), by bus
13:00-14:00 Lunch
14:00-14:40 Welcome Ceremony by local people and introduction to the County
14:40-16:00 Touring by boat on Yujiang River - bamboo plantation (*Bambusa intermedia*
Hsueh et Yi) along the River
16:00-17:20 Plant Memorial Bamboo in the Century Bamboo Garden
17:20-18:00 Arrive in Shunan Hotel
18:30-19:30 Dinner
Stay in Shunan Hotel of Changning

18 October

07:30-08:00 Breakfast
08:00-09:00 Bamboo Museum
09:00-10:00 Household Bamboo Mah - Jong Mat Processing Plant in Nonglin Village
10:00-11:00 Bamboo Carving Manufacture in Baiyang Village
11:00-12:00 A bird view of the bamboo sea
12:00-13:30 Lunch
13:30-15:00 Jinrong Bamboo and Wood Products Co., Ltd. - Bamboo Floor and
Decoration Board Manufacture.
15:00-16:00 Huida Building Material Limited Co. - Bamboo Veneer and Particle Board
Manufacture
16:00-17:30 Bamboo Pulp Factory (manufacture packaging paper)
18:00-19:00 Dinner

19 October

07:30-08:20 Breakfast
08:20-08:30 Check out, load the luggage on bus
08:30-10:30 Changning - Yibin, by bus
10:30-12:00 Free
12:00-13:30 Lunch
14:00-17:00 Bamboo Product Exhibition of the China Bamboo Culture Festival
18:00-19:00 Dinner, Stay in Yibin for night

20 October

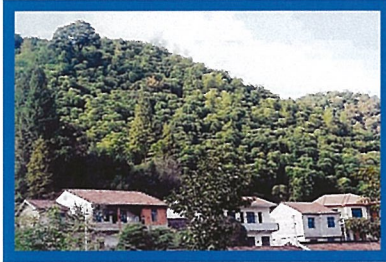
07:00-07:50 Breakfast
08:00-10:30 The Opening Ceremony of the Third China Bamboo Culture Festival
10:30-12:30 Evaluation of the Workshop and Conclusion
12:30-14:00 Lunch
14:00-17:30 Free
18:00-19:30 Banquet
20:00-22:00 Culture Performances

21 October

06:20-06:50 Breakfast
06:50-07:00 Check out, load the luggage on bus (all luggage must on board before 7:00)
07:00-10:00 Yibin - Chengdu, by bus
12:00-15:00 Chengdu-Shanghai, by air
17:30-21:00 Shanghai-Bangkok, by air

Annex 4.3 Workshop Photographs

1. Bamboo Species for Productions



Bamboo plantation and farmer's houses



Bamboo market



Moso bamboo



Bamboo stick



Spot bamboo

2. Field Studies



Bamboo studied tour



Bamboo processing machinery factory



Bamboo flooring factory



Bamboo paper factory



Bamboo toothpick factory

Household Bamboo Mah-jong Mat Processing



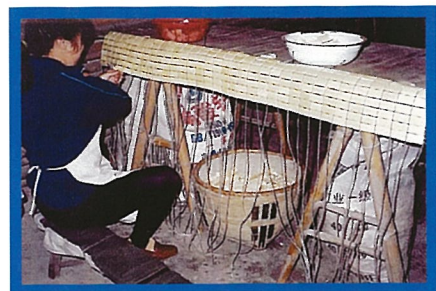
Long cutting



Hole Making

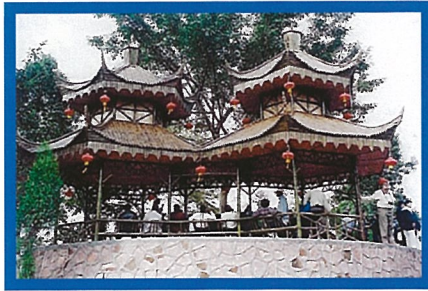


Cutting into pieces



Mah-jong Mat Knitting

3. Bamboo Utilization



Bamboo pavilion



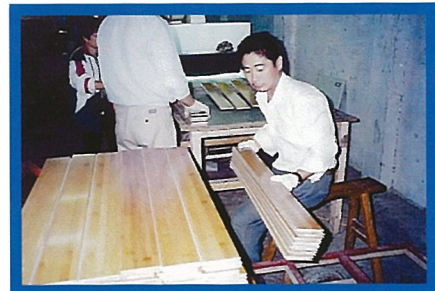
Bamboo landscape products



Bamboo furniture



Bamboo board



Bamboo flooring



Bamboo handicraft picture



Bamboo products



Bamboo mats



Bamboo lanterns