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

SUSTAINABLE DEVELOPMENT OF BAMBOO RESOURCES

Proceedings of the National Conference on Sustainable Development of Bamboo Resources
Chiangmai, Thailand

Royal Forest Department
International Tropical Timber Organization
Bangkok, Thailand

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ORGANIZING COMMITTEE

Chairman:

Chatchai Ratanophat
Director General, Royal Forest Department

Members:

Pairoaj Punpugdee
Acting Deputy Director General, Royal Forest Department,
Director, Forest Economics and Forest Products Research Office

Bunvong Thaiutsa
Faculty of Forestry, Kasetsart University

Songkram Thammincha
Faculty of Forestry, Kasetsart University

Director of Reforestation Office

Director of Bureau of Community Forest Management

Suchart Thaipeth
Project Director, RFD/ITTO Project PD 56/99 Rev.1(I)

Wanida Subansenee
Project Leader, RFD/ITTO Project PD 56/99 Rev.1(I)

Anan Anantachot
Faculty of Forestry, Kasetsart University

Ladawan Puangchit
Faculty of Forestry, Kasetsart University

Wichan Ruechuroj
VC Bamboo Industry Ltd., Part.

Pannee Denrungruang
Project Staff, RFD/ITTO Project PD 56/99 Rev.1(I)

Mayuree Jitkeaw
Project Staff, RFD/ITTO Project PD 56/99 Rev.1(I)

Rungnapa Puttanapiboon
Department of National Parks, Wildlife and Plant Conservation

Secretary:

Nuchanart Nilkamheang
Project Staff, RFD/ITTO Project PD 56/99 Rev.1(I)

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OPENING REPORT

by

Mr. Chatchai Ratanophat

Director General, Royal Forest Department

Dr. Plodprasop Suraswadi, Permanent Secretary of Ministry of Natural Resources and Environment,

On behalf of the Organizing Committee of the National Conference on Sustainable Development of Bamboo Resource, I would like to express my sincere thanks for your kindness to preside over the official opening of the National Conference on Sustainable Development of Bamboo Resource.

Bamboo is a non-wood forest product naturally occurs in Asia, Central and South America, and Africa. It is one of the important commercial plants with a significant role in terms of employment opportunity and income generation of the rural people. There has been a long history and culture of extensive utilization of bamboo such as shoots for food; culms for construction, fuel, handicrafts, furniture, utensil, paper, cloth, and musical instruments; leaves for wrapping. However, utilization of bamboo in Thailand has not yet been advanced due to the lack of knowledge on management, cultivation, wood preservation, gregarious flowering, efficient processing, and value-added of bamboo products. The Royal Forest Department has strongly recognized the importance of bamboo industry development by launching the project on Promotion of the Utilization of Bamboo from Sustainable Sources in Thailand. The Project lasts from October 2000 to March 2004 with financial support from the International Tropical Timber Organization (ITTO).

As the Project is at its final stage, the Royal Forest Department organizes this national conference as a venue for brain-storming among bamboo experts, scientists, academics, government officials, farmers, entrepreneurs, and individuals who are interested in bamboo cultivation, management, and utilization. It is expected that the participants will have an opportunity to exchange their knowledge and experience and find out appropriate directions of sustainable development of bamboo resource. Apart from technical sessions, the Conference includes also a video presentation about the project activities, exhibitions, and excursion. The organizing committee have received an active cooperation from Chiangmai University, Rajabhat

University, Department of Industrial Promotion, Chiangmai Zoo, Queen Sirikit Botanical Garden, the Royal Project, entrepreneurs, and community leaders. The objectives of this conference are 1) to promote and transfer the knowledge and technology of sustainable management and utilization of bamboo, 2) to arrange a venue for brain-storming among participants in order to draw recommendations for bamboo industry development in both public and private sectors, and 3) to activate industrial groups and rural communities for continuous promotion and development of bamboo industries. There are 200 participants including administrators, scientists, entrepreneurs, farmers, and community leaders. The final day of the conference will be devoted to group discussion on 3 important issues : 1) cultivation, management, and promotion; 2) utilization technology and marketing; and 3) laws and regulations.

May I now request your honor, Mr. Permanent Secretary, to officially open the National Conference on Sustainable Development of Bamboo Resource.

OPENING ADDRESS

by

Dr. Plodprasop Suraswadi

Permanent Secretary, Ministry of Natural Resources and Environment

Chairman of the Organizing Committee, ITTO Representative, Resource Persons, Distinguished Participants, Ladies and Gentlemen,

It is my great honor and pleasure to preside over the National Conference on Sustainable Development of Bamboo Resource in Thailand. First of all, I would like to thank the Royal Forest Department, the International Tropical Timber Organization (ITTO), members of the Organizing Committee and staff for their tireless efforts devoted to organizing this important meeting.

Bamboo is an economic plant species commonly known in Asia as one of the commodities firmly linked with the way of life and culture of the rural people for a long time. Every part of bamboo can be used. It is called a miracle plant due to its very fast growing and being cultivated only once for a long-term use. Bamboo plays an important role in rural employment and income generation.

I am glad to hear that this Conference is arranged as a venue for brainstorming. The exchange of knowledge and experience among all participants during these three days of the meeting will lead to solve the problems and alleviate the obstacles of bamboo industry development. I assume that the suggestion on appropriate practices for cultivation, management, efficient and value-added utilization of bamboo will be one of the important outputs from this gathering. I would like to encourage all of you to discuss about the problems and limitation of laws and regulations relating to bamboo and suggest how to eliminate these barriers. I am absolutely sure the outcomes of this conference will be very useful to future development of bamboo resource, as well as to economic and social development of Thailand as a whole.

May I take opportunity to express my sincere thanks for your participation. I wish you all a good health and a safe and sound journey back home after the end of this meeting.

I now declare the National Conference on Sustainable Development of Bamboo Resource in Thailand open.

OPENING REMARKS

by

Dr. Hwan Ok Ma

Projects Manager
International Tropical Timber Organization (ITTO)

Dr. Plodprasop Suraswadi, Permanent Secretary of Ministry of Natural Resources and Environment, Mr. Chatchai Ratanophat, Director General of the Royal Forest Department, Mr. Pairoaj Punpugdee, Director, Forest Economic and Forest Products Research Office, Mrs. Wanida Subansenee, Project Leader for ITTO Bamboo Project, Distinguished Guests, Participants, Ladies and Gentlemen,

It is indeed a great honor and pleasure for me to address you on the occasion of the opening ceremony of the National Conference on Bamboo 2004: Sustainable Development of Bamboo Resource in Thailand.

First of all, on behalf of Dr. Sobral Manoel Filho, the Executive Director of the International Tropical Timber Organization, I would like to welcome all of you to the Conference and extend to you ITTO's best wishes for its success. I would also like to thank the Royal Forest Department for its excellent efforts in organizing this Conference. It is a pleasure to be in Chiangmai, where ITTO had a great session of the International Tropical Timber Council in 1999, with the cooperation of the Royal Forest Department, particularly Dr. Plodprasop Suraswadi.

ITTO is an inter-governmental organization which promotes-sustainable development through the conservation, management and use of tropical forests. It has 58 members, which collectively represent about 85% of the world's tropical forests and 90% of the global tropical timber trade. ITTO is dedicated to making a difference in the sustainable development of tropical forests.

As you know, natural forests in many tropical countries are degrading rapidly in terms of quantity, quality and biodiversity. In the meantime, local communities are more dependent on the benefits from the forests for their living. However, in general, the current policy on forest management is not sufficient to accommodate the demand of local communities. As a result, there is a limited progress in sustainable forest management in many tropical countries. It would therefore be important to empower villagers living around the forest to guarantee the effective implementation of sustainable forest management. I believe that introduction of income generation

activities such as introduction of bamboo would be one form of empowering villagers on economic aspects and at the same time improving the efficiency of forest management.

Of all the tropical non-timber forest products, bamboo is probably the most well-known and potential species. According to an article in Asian Timber (January/February 2004), it is noted that bamboo has some 1,300 species distributed among tropical, subtropical and mild temperate zones, covering a total area of over 25 million hectares. One of the world's most interesting plant groups, bamboo is emerging as an exciting new economic opportunity for Asia's forest industry. Improved processing technologies, especially in terms of greater durability and better finish, have resulted in greater diversity and improved quality of bamboo products. In many tropical timber consuming countries like the United States, EC and Japan, various bamboo products are being introduced. Bamboo flooring, for example, has been promoted in a remarkable way by China.

In this regard, I believe that the benefits from the promotion of bamboo would be vital to efforts at creating greater value for tropical forests. These benefits can be utilized to strengthen forest management and support overall economic development efforts. This will in turn provide the basis for a continuous flow of forest products and services, essential for the conservation and sustainable use of tropical forests.

This National Conference will focus on crucial elements for the further development of the bamboo sector in Thailand, including plantations, management, production technology, markets and trade. I wish to congratulate the organizers of this Conference for assembling many distinguished experts to deliver papers on important issues and for greater participation of all stakeholders. This gathering of bamboo experts in the country is certain to generate productive discussions towards further development of the Thai bamboo sector.

I believe you will all be making important contributions to this Conference so that appropriate recommendations and action plans for each of the key stakeholders can be formulated in support of the development of the bamboo sector in the 21 century. In particular, it would be worthwhile if the Conference could identify opportunities and constraints in the establishment of bamboo plantations through greater participation of the private sector.

Future research and development work to facilitate the efficient and diversified utilization of bamboo in value-added niche markets as well as marketing for bamboo products would be another important issue to be discussed in the Conference.

Yesterday, I was pleased to visit Pa Bong Loung Village, who is a winner of bamboo candles product under the One Tambon One Product (OTOP) program campaigned by the Government of Thailand. I hope more opportunities in promoting various bamboo products will be identified in other Tambons in line with this OTOP program after this Conference.

I trust that this Conference will examine all relevant issues on the promotion of bamboo in Thailand and identify practical recommendations for future development of the Thai bamboo sector in a sprit of solidarity guided by ITTO's mandate to promote the conservation and utilization of tropical forest resources.

Ladies and gentlemen, may I once again wish you a successful Conference.

Thank you for your attention.

PANEL DISCUSSION

ATTRACTIVENESS OF BAMBOO AND LOCAL KNOWLEDGE FOR DEVELOPMENT OF BAMBOO PRODUCTS

Phuthorn Bhumadhon

Rajabhat Thepsatri University, Lopburi

1. Bamboo Attractiveness

Bamboo is an attractive plant due to the following reasons.

1) Bamboo has the characteristics of art. It is a plant species that strongly inspires the artists for their emotion and passion of arts, particularly Chinese painting. Bamboo grows in clump with willowy crown of slender stem or culm. There are different colors of bamboo culms, e.g. green, black, yellow, golden, ivory. Every part of bamboo is so beautiful to represent an artistic product of the nature.

2) Bamboo normally grows around dwelling area creating pure and peaceful emotion and atmosphere.

3) The sound of bamboo crown and culm movement represents the sound of nature and inspiration of artists to symbolize the rural life principles of nature, faith, and sincerity. The sound of bamboo musical instruments gently disperses in the air such as flute, pipe, and xylophone creating a finer and more solitude impression than that of musical instruments from metal and wooden materials.

4) Bamboo products like bamboo houses represent beautiful arts and handicrafts of specific characteristics of bamboo. The slats and slivers from the skin of bamboo culms are smooth and shiny making the wattles of the house look more glamour with bamboo identity. Very fine arts and skills make the products become more valuable.

5) Bamboo is a plant for four basic needs of life, *i.e.*, shelter (bamboo housing), food (shoot), clothing (rayon), and medicine. A number of tools and utensils for daily uses from birth to death are made of bamboos.

2. Local Knowledge of Bamboo Utilization

People in Thailand have known the uses of bamboo since pre-historic period, *i.e.*, more than 3,000 years ago. Some types of pottery with the pattern of bamboo weaving on the surface have been found at Ban Chiang archaeological site in Udon Thani province and at Ban Chaimongkol

archaeological site in Nakhon Sawan province. The items found from the excavation of Ban Nong Chaesao archaeological site in Ratchaburi province have been proved to be as old as 3,000 years. Archaeologists also found the trace of human housing made of bamboo. Human skeleton wrapped with bamboo mat was found at Khao Phuka archeological site in Lopburi province.

There is an evidence that different items from stones and bones during pre-historic period were made using bamboo as main instrument. The people during that period used bamboo sticks or bamboo culms with fine sand as a medium in sizing the stones and the bones into items of different shapes such as rings. Since then people have accumulated their experience and local knowledge on numerous ways of bamboo utilization, to be mentioned in this context is bamboo housing. The local knowledge on bamboo housing has two prominent characters : bamboo-wattle house and floating house or boathouse.

2.1 Bamboo House

Bamboo wall or partition is the main part of bamboo house. There are four types of bamboo-walled house.

1) The wall prepared from bamboo culms of particular length, chopped longitudinally and spread as a plate of required width.

2) The wall prepared from bamboo mat of woven large-sized bamboo slats. This type of bamboo-walled house is commonly found in southern Thailand, particularly the house in Muslim community.

3) The wattle prepared from bamboo splits put on the horizontal wall skeletons.

4) The partition prepared from bamboo culms of particular length arranged vertically and horizontally with liners of young nipa palm leaves.

Bamboo and wooden houses with bamboo walls have good ventilation, the residents being more comfortable compared to those of other materials. Bamboo walls are cheap and easy to prepare. They may be used as an interior decoration that represents typical characteristics of Thai culture, agricultural society, and simple life style.

2.2 Floating House or Boathouse

Floating house or boathouse is an innovation by the people living along the rivers in flood plain areas of central Thailand. With intricate river and canal systems, boats are important mode of transportation and floating houses become the typical residences of these people. Bamboo is the most

suitable material for floating house due to its lightweight and availability. The house is built on the bamboo raft

2.3 Bamboo Boat

Bamboo boat is simply made from woven bamboo slats and coated with the resin of *Dipterocarpus alatus*. The boat is normally big enough to accommodate 2-3 people for short-distance transport. Bamboo boat is cheap and easy to build. Thus, it is called the "Poor Man Boat."

Bamboo boats are found in Sri Prachant district of Suphanburi province and in Pak Phanang district of Nakhon Sri Thammarat. Nowadays, there is almost no existence of bamboo boats in Thailand, only to be told by the old generations. However, bamboo boats are still commonly found in Danang province of Vietnam. There are two types of bamboo boat in Vietnam : a long boat with small ends and a round one or a basket boat.

In conclusion, people in Thailand have known how to utilize bamboo since pre-historic period. Bamboos are used for making a number of household items and housing. There are different types of bamboo wall or partition, each of which represents Thai characteristics. Floating house is an excellent constructive knowledge of local people in flood plain areas of central Thailand. Floating house and bamboo boat are an important evidence to represent Thai culture and local knowledge of the society with typical happy life style in harmony with the environment of flood plain areas of central Thailand.

เสน่ห์ของไผ่และภูมิปัญญาไทยเพื่อการพัฒนาผลิตภัณฑ์

นายภูธร ภูมะธน

สถาบันราชภัฏเทพสตรี ลพบุรี

เสนอ ในการประชุมและสัมมนาเรื่อง

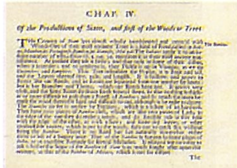
การพัฒนาทรัพยากรไม้ไผ่อย่างยั่งยืน

๒๕ มีนาคม ๒๕๔๗ ณ โรงแรมเชียงใหม่ภูคำ

จังหวัดเชียงใหม่

เสน่ห์ของไผ่

เสน่ห์ตามความหมายในพจนานุกรมหมายถึง**ลักษณะที่ชวนให้รัก** สำหรับเรื่องของไผ่นั้นผมเชื่อว่าเป็นพืชชั้นแนวหน้าที่ชวนให้คนรักและอาจจะเพิ่มดีกรีในระดับหลงไหลได้ด้วยนั้น เพราะไผ่มีคุณสมบัติและลักษณะเฉพาะตัว ไม่มีใครเหมือนและไม่เหมือนใคร กลายเป็นพืชมีเสน่ห์จริง พิสูจน์ได้จากเหตุผลดังนี้

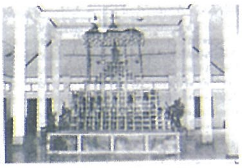

CHAP. IV.

๑. ไผ่มีรูปลักษณ์เป็นศิลปะ จึงเป็นพืชชนิดเดียวที่ฝังใจบรรดาเหล่าศิลปินนำมาสื่ออารมณ์ศิลปินของตนมากที่สุดโดยเฉพาะในศิลปกรรมภาพวาดจีนทั้งนี้เพราะไผ่ขึ้นเป็นกอ มีทรวดทรงสูงชะลูดเพรียว มียอดโน้มห้อยลงมา ลำไผ่มีผิวหลายสีเช่นสีเขียวมัน สีดำ สีเหลืองทอง สีเหลือง สีงาช้างเป็นต้น ไม่ว่าจะพิจารณาส่วนไหนของต้นไผ่ เช่น กิ่งก้าน ใบ กอ จึงดูงามซึ้งไปทั้งสิ้น ไผ่จึงเป็นพืชศิลปะที่ธรรมชาติสร้างสรรค์ให้มาให้กับโลก

๒. กอไผ่ขึ้นอยู่รอบ ๆ ถิ่นฐานที่อยู่ทำให้เกิดอารมณ์บรรยากาศบริสุทธิ์ สงบและงดงาม

๓. เสียงลมพัดผ่านใบไผ่ (เสียงไผ่ต้องลม) หรือเสียงที่เกิดจากลำไผ่เสียดสีกัน เป็นเสียงเกิดจากธรรมชาติ ได้เป็นแรงบันดาลใจให้ศิลปินได้นำเสียงมาเปรียบเปรยให้เกิดอารมณ์ชีวิตชนบท คือ อยู่อย่างธรรมชาติ ซื่อสัตย์จริงใจ อีกทั้ง เครื่องดนตรีที่ทำจากไผ่นั้นมักเป็นเป็นเครื่องดนตรีที่มีเสียงเบาล่องลอยไปตามลม เช่น ขลุ่ย แคน ทำให้เกิดอารมณ์ละเมียดละไม ครื้มและเศร้าสร้อยได้กว่าเสียงจากวัสดุอื่น เช่น โลหะ หรือไม้จริง

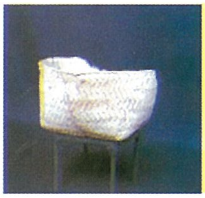
๔. ประดิษฐ์กรรมจากไผ่ เช่น เรือนที่พัก ศิลปหัตถกรรมมีความงามอันเป็นคุณสมบัติเฉพาะ กล่าวคือ ผิวไม้ไผ่หรือตอกไม้ไผ่ที่เรียบเป็นมันแล้วนำมาขัดสานเป็นฝาเรือนหรือทำเป็นวัสดุใช้สอยนั้นมีความงามในตัวเอง มีเอกลักษณ์ หากพิถีพิถันในการทำแล้วก็ยิ่งทำให้ประดิษฐ์กรรมนั้นมีคุณค่าสุนทรียมากยิ่งขึ้น



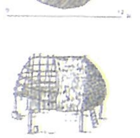
๕. จะหาพืชอื่นใดที่มีประโยชน์ต่อมนุษย์อย่างหลากหลายยิ่งกว่าไผ่เป็นไม่มี กล่าวคือ เป็นได้พร้อมทุกข้อในปัจจัย ๔ คือใช้สร้างเป็นที่อยู่อาศัย ใช้เป็นอาหาร ใช้ทำหมวก ทำร่ม ใช้เป็นยารักษาโรคก็ได้ มากยิ่งไปกว่านั้นคือนำมาทำเป็นเครื่องมือเครื่องใช้ในวิถีชีวิตได้สารพัด ตั้งแต่เกิดจนตายคือใช้ไผ่ทำมีดตัดสะดือแรกเกิดจนกระทั่งใช้ไผ่ทำฟากห่อศพ

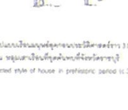
ภูมิปัญญาไทยในการใช้ประโยชน์จากไผ่: เฉพาะประเด็นเรือนและเรือไม้ไผ่

คนในประเทศไทยรู้จักการใช้ประโยชน์จากไผ่นานครั้งยุคก่อนประวัติศาสตร์ อายุนานไม่น้อยกว่าสามพันปีก่อน กล่าวคือ พบหลักฐานภาชนะดินเผาที่มีการตกแต่งผิวด้านนอกด้วยลายจักสานที่แหล่งโบราณคดีบ้านเชียง(อำเภอหนองหาน จังหวัดอุดรธานี) และแหล่งโบราณคดีบ้านชัยมงคล(อำเภอตาคลี จังหวัดนครสวรรค์)



การขุดค้นแหล่งโบราณคดีบ้านหนองแช่เสา จังหวัดราชบุรีมีอายุราวสามพันปีก่อน นักโบราณคดีได้พบร่องรอยของเรือนมนุษย์ยุคนั้นเป็นเรือนเครื่องผูกที่คงสร้างด้วยไม้ไผ่ ที่แหล่งโบราณเชิงเขาพุคา จังหวัดลพบุรี พบโครงกระดูกมนุษย์ยุคก่อนประวัติศาสตร์ห่อศพด้วยฟากไม้ไผ่แล้วจึงนำไปฝัง





Re- constructed style of house in prehistoric period (c.3000 Bc)

ส่วนหลักฐานการใช้ประโยชน์จากไผ่ทางอ้อมของมนุษย์ยุคก่อนประวัติศาสตร์นั้น คือการทำกำไลหรือแหวนด้วยหินหรือกระดูกสัตว์นั้น มีข้อสันนิษฐานว่า มนุษย์ใช้ลำไผ่หมุนคลึงไปบนวัสดุที่ต้องการ โดยใช้ทรายละเอียดเป็นตัวช่วยกัดเซาะจนเป็นวัตถุที่ต้องการ

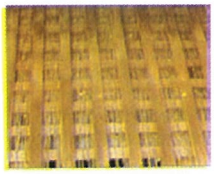
นี่คือหลักฐานเก่าสุดที่พบว่ามีการใช้ประโยชน์จากไผ่โดยมนุษย์ในประเทศไทย และก็ต้องยอมรับว่า เริ่มมีความหลากหลายในการใช้ประโยชน์จากไผ่แล้ว

นับพันปีนับต่อจากนั้น จนถึงกาลเวลาปัจจุบัน มนุษย์ได้เพิ่มพูนประสบการณ์และภูมิปัญญาในการใช้ประโยชน์จากไผ่อีกมากมาย แต่ที่อยากกระบุในที่นี้คือ **ภูมิปัญญาในการใช้ไผ่สร้างเรือน** ซึ่งมีลักษณะเด่น ๒ ประการคือ**ฝาเรือนทำด้วยไผ่** และ **เรือนแพ**

เรือนสร้างด้วยไม้ไผ่ทั้งหลังเรียก**เรือนเครื่องผูก** ส่วนเรื่องสร้างด้วยไม้จริงเรียก**เรือนเครื่องสับ** ในบางครั้งเรือนแบบหลังยังใช้วัสดุไผ่ปนกับไม้จริงในการก่อสร้างโดยเฉพาะการทำฝาเรือน การนำไม้ไผ่ทำฝาเรือนมีหลายรูปแบบ กล่าวคือ

ฝาฟาก คือการนำไม้ไผ่ทั้งลำมาสับให้เป็นซี่แล้วผ่าปอกคลี่เป็นแผ่นยาว ตัดเป็นแผ่นแล้วนำมากรุทำฝา

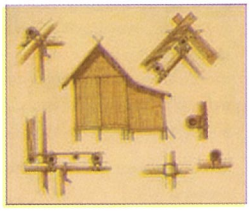
ฝาลำแพนหรือฝาสาน โดยนำไม้ไผ่มาจักเป็นตอกแบนขนาดใหญ่และนำมาสานให้เป็นผืนใช้เป็นฝาเรือนได้ ปัจจุบันยังนิยมทำกันในภาคใต้โดยเฉพาะเรือนชาวมุสลิม



ฝาขัดแตะ เป็นฝาทำด้วยซี่ไม้ไผ่ขัดกับคร่าวนอน(ไม้เซ็น)

ฝาลำหรวด คือฝาที่ทำด้วยลำไม้ไผ่เป็นแนวตั้งและแนวนอน กรุช่องว่างด้วยใบจากอ่อนทำเป็นฝา

ฝาเรือนที่ทำด้วยไม้ไผ่หรือประกอบด้วยไม้ไผ่ดังกล่าวนี้เป็นทั้งฝาเรือน เครื่องผูกและเรือนเครื่องสับ ระบายอากาศได้ดีทำให้ผู้อาศัยไม่ร้อนอึดอัด ทำง่าย ราคาถูก หากนำมาประดิษฐ์ใหม่ ใช้กั้นฝาภายในอาคาร น่าจะเป็นการสำแดงอารมณ์และอกลักษณ์ไทยที่ไม่ล้างผลาญธรรมชาติ เป็นสังคมวิถีกสิกรรมมีนิสัยเรียบง่าย ซื่อสัตย์จริงใจไม่ซับซ้อน และที่สำคัญคือไผ่เป็นวัสดุราคาถูก



เรือนแพ เป็นนวัตกรรมสำคัญของคนในลุ่มแม่น้ำหลายสายในภาคกลางประเทศไทยคิดค้นขึ้นมา ด้วยมีภูมิประเทศเป็นที่ราบลุ่มและมีน้ำท่วมทุกปี แม่น้ำลำคลองใช้เป็นเส้นทางคมนาคมเรือเป็นพาหนะสำคัญ และทำนักอาศัยในเรือนแพ วัสดุสำคัญในการใช้สร้างเรือนแพต้องเป็นวัสดุที่เบา เช่น ไม้ไผ่ รวมทั้งจะทำให้ลอยบนน้ำได้ก็ด้วยตั้งอยู่บนแพลูกบวบซึ่งทำจากไม้ไผ่

เรือนแพสร้างด้วยไม้ไผ่จึงเป็นสิ่งก่อสร้างสำคัญอีกอย่างหนึ่งที่ใช้ประโยชน์จากไผ่แปลกตา เหมาะสมกับพื้นที่ราบลุ่ม จัดเป็นงานสร้างสรรค์อันเกิดจากภูมิปัญญาไทยที่เป็นเอกลักษณ์ที่สำคัญยิ่งอีกอย่างหนึ่ง

เรือไม้ไผ่ มีข้อมูลที่สำรวจพบว่ามีการทำเรือด้วยการนำตอกไม้ไผ่มาสานแล้วใช้ชันยาเรือให้ทั่วทั้งด้านนอกและด้านใน เรือที่ทำจากไผ่มีขนาดไม่ใหญ่นัก นั่งได้ ๒ – ๓ คน ใช้พายไปมาใกล้ ๆ เหตุที่ต้องทำเรือจากไม้ไผ่เพราะทำง่าย ราคาถูก เป็นเรือของคนจน

พื้นที่ที่พบว่าเคยทำเรือไม้ไผ่คือที่อำเภอศรีประจันต์ จังหวัดสุพรรณบุรีและที่อำเภอปากพนัง จังหวัดนครศรีธรรมราช แต่ในปัจจุบันไม่มีหลักฐานของเรือทำด้วยไม้ไผ่ให้เห็นนอกจากข้อมูลจากผู้อาวุโสในพื้นที่ดังกล่าวบอกเล่ามา อย่างไรก็ตาม ในวันนี้ เรือที่ทำด้วยไม้ไผ่ยังคงมีใช้เป็นปกติในจังหวัดดานัง ประเทศเวียดนาม เป็นเรือที่มีเทคนิคการทำไม่ต่างจากคำบอกเล่าของผู้อาวุโสชาวไทย คือสานด้วยตอกไม้ไผ่แล้วจึงใช้ชันยาทั้งด้านนอกและด้านใน เรือไม้ไผ่ของเวียดนามมีสองแบบคือแบบ*เรือรูปร่างชาว*มีหัวและท้ายแหลมแบบเรือที่พบเห็นทั่วไป กับเรือไม้ไผ่รูปกลมเรียก*เรือตะกร้า* เรือไม้ไผ่ของชาวเวียดนามนั่งได้ ๒-๔ คน

สรุปได้ว่า *ในประเทศไทย ผู้คนรู้จักใช้ประโยชน์จากไผ่นานหลายพันปีก่อน ได้มีการนำไผ่มาประดิษฐ์เป็นของใช้และสร้างบ้านเรือน ฝาเรือนของคนไทยซึ่งทำด้วยไผ่มีหลายแบบ ทุก ๆ แบบน่าจะเป็นสิ่งแสดงเอกลักษณ์ไทยได้อีกอย่างหนึ่ง เรือนแพซึ่งมีส่วนประกอบสร้างด้วยไม้ไผ่คืองานสร้างสรรค์อันวิเศษของคนไทยในที่ราบลุ่มแม่น้ำภาคกลางที่นับวันจะหาดูตัวอย่างได้ยาก และยังรู้จักประดิษฐ์เรือไม้ไผ่ใช้ เฉพาะประเด็นเรื่องเรือนแพและเรื่องเรือไม้ไผ่ถือเป็นหลักฐานพิสูจน์ภูมิปัญญาไทยในการในการมีชีวิตที่มีความสุขและมีประสิทธิภาพด้วยการปรับตัวอาศัยอยู่กับข้อจำกัดของสิ่งแวดล้อมคือที่ราบลุ่มแม่น้ำและมีต้นไผ่ขึ้นตามธรรมชาติ*

BAMBOO : A NEW ALTERNATIVE FOR FARMERS

Samniang Sriwichai

Bamboo farmer, Chiangdao District, Chiangmai

Bamboo cultivation should be taken place during middle May and late June. The most appropriate spacing is 5x5 meters. Rhizome cuttings are more suitable planting stock. Prior to planting, the cuttings (rhizome or branch) should be soaked in mud solution (mixture of water, mud and few tablets of insect repellent to avoid termites and insects). Planting is done in the same manner as planting of other tree crops. Watering is not necessary during rainy season, otherwise watering every 3 days is needed. Following are suggested practices for bamboo plantation management.

1) During first year, there should be regular weeding and cleaning of plantation to allow bamboo plants to grow more quickly. When bamboo plants are 1-2 years old, trimming of culm tip to be clump of 1-2 meters high is suggested. Plantation establishment costs range from 3,000 to 5,000 Baht per rai depending upon site conditions.

2) Shoot harvesting should be scheduled aiming to avoid the peak of production period during which the price may drop due to excessive amount of shoots in the market.

Bamboo cultivation is not only advantageous to farmers as an income generation but also to environment. Bamboo helps improve soil fertility, reduce soil erosion, create cleaner air and lower air temperature. In conclusion, farmers will get more than bamboo when cultivating bamboo.

BAMBOO AND THE PANDAS

Sophon Dumnui

Director-General, The Zoological Park Organization
under the Royal Partonage of H.M. the King

The Giant Panda (*Ailuropoda melanoleuca*) looks in general like a bear. Its body is characterized by larger head, short snout, and white fur of the whole body with black fur at the ears, shoulders and legs and around the eyes. The giant panda is a mammal of a bear family and a separate species, but closely similar to sun bear, lesser panda, and raccoon. It does not like to stay immobile, but rather being playful, climbing the trees or finding some thing to eat, and staying awake 12-15 hours per day.

The pandas are isolated animal, except during mating season in spring. Male and female pandas begin to mate when they are 4-5 years old, and the female will have 110-150 days pregnancy. The pair will take care of their young panda. The newly born cub is about 6 inches long and weights about 3-4 ounces, or 1/90 of its mother's weight, with pink skin and white hair. The eyes are closed for about a month, after that the cub will grow rather quickly, *i.e.*, 2.5 kg per month, and becomes an adult with full growth of 60-160 kg.

The Government of the People's Republic of China sent two pandas as the Ambassador of Good Will to Thailand. Following are some details of the ambassador pandas.

	Male panda	*Female panda*
Chinese name	Xuang Xuang	Lin Hui
Thai name	Tewan	Tewee
Local Thai name	Kham Ai	Kham Eui
Born	6 August 2000	28 September 2001

Xuang Xuang and Lin Hui arrived in Chiangmai on 12 October 2003 and stay at their new residence in Chiangmai Zoo.

Bamboo is the main diet and the most important to panda's life, *i.e.*, 99% of the diet is bamboo. In 1975, 150 giant pandas died when there was a mass death of bamboo due to gregarious flowering. Fortunately, the Chinese government and World Wildlife Fund made an efficient preparation and saved the panda's lives when the mass death of bamboo recurred in 1983.

Before Xuang Xuang and Lin Hui arrived in Thailand, the Chiangmai Zoo and Zoo Organization of Thailand set a team to search for species and

sources of bamboo for food of these two pandas. Following are some species of Chinese bamboo growing at the Royal Ang Khang Agricultural Station.

Squared bamboo	*Chimonobambusa quadrangularis*
Makinoi bamboo	*Phyllostachys makinoi*
Jade bamboo	*Bambusa oldhamii*
Haired bamboo	*Phyllostachys pubescens*
Soides bamboo	*Phyllostachys bambusoides*
Litho bamboo	*Phyllostachys lithophila*
Black bamboo	*Phyllostachys nigra*

These bamboos are of monopodial type, except *Bambusa oldhamii*, with small culms and small leaves. The pandas prefer to eat the leaves of these bamboos. The pandas can manage well with local Thai bamboos and there is a tendency that they prefer Thai bamboos to the Chinese ones. Following are Thai bamboos for the panda's diet.

Pai Tong	*Dendrocalamus asper*
Pai Sang Kham	*Bambusa vulgaris*
Pai Ruak	*Thyrsostachys siamensis*
Pai Rauk Dam	*Thyrsostachys oliveri*
Pai Bong Yai	*Dendrocalamus brandisii*

The pandas eat Thai bamboos differently from the Chinese ones, *i.e.*, by taking off the culm skin with their teeth before eating. The pandas have the habit of eating one bamboo species as a main diet with 1-3 species as supplement for some time before shifting to other species. The zoo curator must observe closely in order to provide the pandas with new species. Following are the results from observation on the main and supplementary diets of the pandas at Chiangmai Zoo.

12 Oct.-11 Nov. 2003	Main diet	: Pai Tong
	Supplement	: *Phyllostachys lithophia*
		Phyllostachys makinoi
12 Nov.-11 Dec. 2003	Main diet	: Pai Tong
	Supplement	: Pai Sang Kham
		Phyllostachys lithophia
		Phyllostachys makinoi
12 Dec. 2003-11 Jan. 2004	Main diet	: Pai Sang Kham
	Supplement	: Pai Tong
12 Jan.-11 Feb. 2004	Main diet	: Pai Saang Kham
	Supplement	: Pai Rauk

12 Feb.-11 Mar. 2004	Main diet	: Pai Bong Yai
	Supplement	: Pai Ruak Dam
12 Mar.-11 Apr. 2004	Main diet	: Pai Bong Yai
	Supplement	: *Phyllostachys makinoi*
		Phyllostachys lithophia

The pandas can eat any bamboo in the world depending upon their individual preference. The pandas live outside China can eat local bamboo and there is no need to import Chinese bamboo to feed them. The pandas at Sandiego Zoo in USA eat the following bamboos : *Phyllostachys aurea, Phyllostachys bambusoides*, *Phyllostachys nigra*, *Bambusa glaucescens*, *Bambusa oldhamii*, *Bambusa textilis*, *Bambusa tuldoides*, *Bambusa ventricosa*, *Bambusa vulgaris*, and *Fargesia fungosa*. The pandas at Ocean Park in Hong Kong enjoy eating the following bamboos : *Bambusa striada vario*, *Bambusa vulgaris* schrader cv. "wamin" (Brandis), *Dendrocalamus latiflorus*, and *Pseudosasa hindsii*.

It is great that the pandas can manage very well with some Thai bamboos. Thailand can be an important supplier of bamboo for panda feed in the future when China may face the shortage of panda feed due to mass death of bamboo because of gregarious flowering or other causes.

ไผ่กับหมีแพนด้า

โดย โสภณ ดำนุ้ย

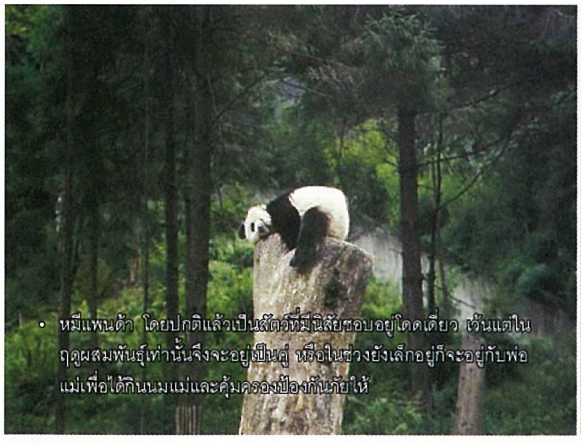
ผู้อำนวยการองค์การสวนสัตว์

หมีแพนด้า

(Giant Panda, *Ailuropoda melanoleuca*)

หมีแพนด้า มีรูปร่างลักษณะคล้ายหมีทั่วไป แต่ที่ผิดแผกแตกต่างไปก็คือ มีหัวใหญ่ จมูกสั้น ขนทั้งตัวจะเป็นสีขาว แต่ขนที่หู ขอบตาโดยรอบ แขนหรือขาหน้าทั้ง 2 ข้าง และขาหลังทั้ง 2 ข้าง ตลอดจนหัวไหล่จะมีสีดำ

นักวิทยาศาสตร์เชื่อกันว่า หมีแพนด้า เป็นสัตว์เลี้ยงลูกด้วยนมตระกูลหมีชนิดหนึ่ง (A bear family) และเป็นชนิด (Specy) เอกเทศที่ไม่ร่วมอยู่กับชนิดใดชนิดหนึ่งโดยเฉพาะ แต่ก็มีส่วนใกล้เคียงกับหมีคนหรือหมีหมา (Sun bear) และ แพนด้าเล็ก (Lesser panda) และตัวแรคคูน (Raccoon)



- หมีแพนด้า โดยปกติแล้วเป็นสัตว์ที่มีนิสัยชอบอยู่โดดเดี่ยว เว้นแต่ในฤดูผสมพันธุ์เท่านั้นจึงจะอยู่เป็นคู่ หรือในช่วงยังเล็กอยู่ก็จะอยู่กับพ่อแม่เพื่อได้กินนมแม่และคุ้มครองป้องกันภัยให้

หมีแพนด้าเป็นสัตว์ที่ไม่ชอบอยู่นิ่ง ระเล่น หรือมีกิจกรรมต่างๆที่จะต้องทำตลอดเวลา ไม่เสียที่ปีนป่ายต้นไม้ หรือออกเที่ยวหาอาหารกิน ซึ่งโดยปกติแล้วจะหากินวันละ 12 – 15 ชั่วโมง

- หมีแพนด้าเริ่มสืบพันธุ์ได้เมื่ออายุประมาณ 4 - 5 ปี และโดยปกติจะผสมพันธุ์ในฤดูใบไม้ผลิ ซึ่งตกอยู่ในราวเดือนเมษายน-พฤษภาคม จะตั้งท้องนานประมาณ 110-150 วัน และโดยทั่วไปมักจะออกลูกในราวเดือนสิงหาคม-กันยายน

- ลูกที่เกิดใหม่จะมีความยาวประมาณ 6 นิ้ว น้ำหนักประมาณ 3-4 ออนซ์ หรือราวเศษ 1 ส่วน 900 ของน้ำหนักของแม่ เมื่อเกิดใหม่ๆ จะมีสีชมพู เป็นสีขาวตลอดทั้งตัว ตายังไม่ลืม อายุได้ประมาณ 1 เดือน ตาจึงจะลืม หลังจากนั้นก็จะโตและมีน้ำหนักเพิ่มขึ้นอย่างรวดเร็ว โดยเฉลี่ยเดือนละ 2.5 กิโลกรัม และเมื่อโตเต็มที่จะมีน้ำหนักประมาณ 60-160 กิโลกรัม

- ช่างช่อง – หลินฮุ่ย เดินทางมาถึงจังหวัดเชียงใหม่ และเข้าพักที่บ้านหลังใหม่ในวันที่ 12 ตุลาคม 2546

ไผ่กับหมีแพนด้า

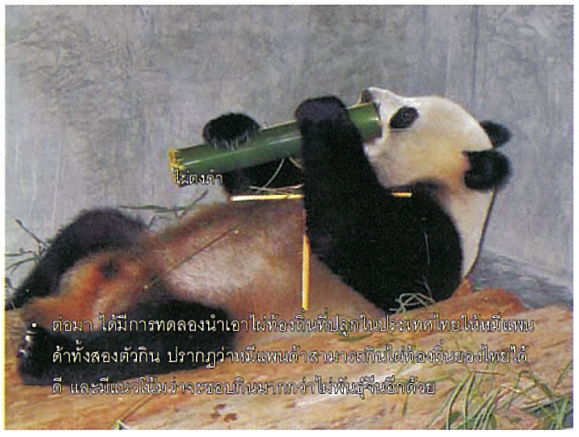
- ไผ่ เป็นอาหารหลัก และเป็นสิ่งสำคัญที่สุดในชีวิตของหมีแพนด้า ในป่า นักวิทยาศาสตร์กล่าวว่า อาหารที่แพนด้ากิน ร้อยละ 99 เป็นไผ่

- ในปี 1975 เมื่อไผ่ร่มตาย ปลายปีนั้นแพนด้ายักษ์กว่า 150 ตัวก็ตาย ปี 1983 ไผ่ธนูตาย แพนด้าก็อยู่ในภาวะอันตรายอีกครั้ง แต่ในครั้งหลังนี้ จีนและมูลนิธิคุ้มครองสัตว์ป่าได้เตรียมพร้อมและช่วยให้แพนด้ารอดชีวิตได้

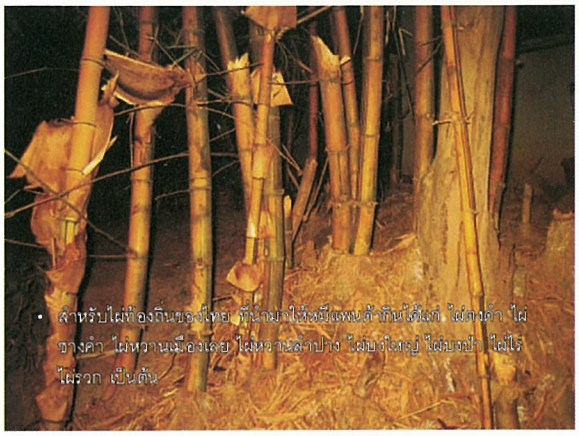
- ก่อนที่ หมีแพนด้าทั้งสองตัวจะเดินทางมาอยู่ภายใต้การดูแลขององค์การสวนสัตว์ ที่สวนสัตว์เชียงใหม่ องค์การสวนสัตว์ได้ดำเนินการสำรวจหาแหล่งไผ่ประเภทไหนที่หมีแพนด้าสามารถกินได้ตามที่ต้องการ

- พบว่า มูลนิธิคุ้มครองสัตว์ป่าได้นำไผ่พันธุ์ที่หมีแพนด้าสามารถกินได้มาปลูกไว้จำนวนหลายชนิด อาทิ
- ไผ่สี่เหลี่ยม (Chimonobambusa quadrangularis)
- ไผ่มากินอย (Phyllostachys makinoi)
- ไผ่หยก (Bambusa oldhamii)
- ไผ่ซน (Phyllostachys pubessence)
- ไผ่เซอิส (Phyllostachys bambusoides)
- ไผ่ลิโด (Phyllostachys lithophila)
- ไผ่ดำ (Phyllostachys nigra) เป็นต้น

- ไผ่พวกนี้ เป็นไผ่ลำเดี่ยว ที่ลำต้นและใบมีขนาดค่อนข้างเล็ก ซึ่งหมีแพนด้าจะเลือกกินเฉพาะส่วนที่เป็นใบเป็นส่วนใหญ่



- ต่อมา ได้มีการทดลองนำเอาไผ่ท้องถิ่นที่ปลูกในประเทศไทยให้หมีแพนด้าทั้งสองตัวกิน ปรากฏว่าหมีแพนด้า สามารถกินไผ่ท้องถิ่นของไทยได้ดี และมีแนวโน้มว่าจะชอบกินมากกว่าไผ่พันธุ์จีนซึ่งนำมาด้วย



- สำหรับไผ่ท้องถิ่นของไทย ที่นำมาให้หมีแพนด้ากินได้แก่ ไผ่สีสุก ไผ่ซางคำ ไผ่หวานเมืองเลย ไผ่หวานลำปาง ไผ่บงใหญ่ ไผ่บงน้ำ ไผ่ไร่ ไผ่รวก เป็นต้น

- ลักษณะการกินไผ่ท้องถิ่นของไทยของหมีแพนด้า จะแตกต่างจากการกินไผ่พันธุ์จีน คือ หมีแพนด้าจะเลือกกินส่วนที่เป็นลำต้นด้านใน โดยจะใช้ฟันฉีกเป็นซีกแล้วฉีกส่วนนอกที่เป็นเปลือกและผิวด้านนอกออก แล้วจึงจะกัดเนื้อไผ่กินเป็นคำๆ

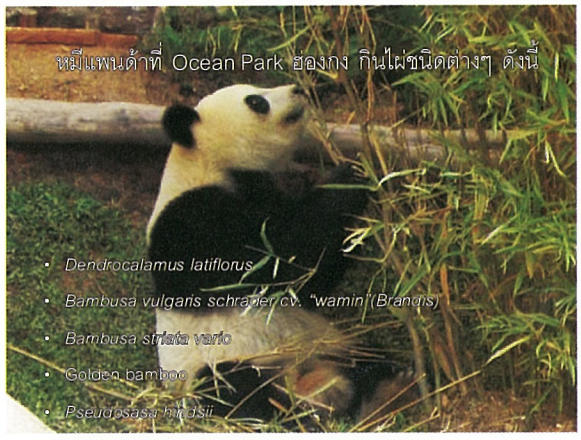
- สำหรับพฤติกรรมการกินไผ่ของหมีแพนด้าอีกอย่างหนึ่งก็คือ หมีแพนด้าจะเลือกกินไผ่ชนิดใดชนิดหนึ่งเป็นหลัก โดยมีไผ่อีกบางชนิดเป็นตัวเสริม เมื่อกินไผ่ชนิดนั้นๆหมดแล้วก็จะเปลี่ยนชนิดใหม่ โดยที่คนเลี้ยงจะต้องคอยสังเกตพฤติกรรมดังกล่าวอย่างใกล้ชิด เพื่อจัดหาไผ่ชนิดใหม่ให้ทันที

- 12 ธ.ค. – 11 พ.ย. 2546 จะกินไผ่ตงเป็นหลัก โดยมีไผ่ลิตโตเพีย และไผ่มาดาอองเป็นไผ่เสริม
- 12 พ.ย. – 11 ธ.ค. 2546 จะกินไผ่ตงเป็นหลัก และเริ่มจะกินไผ่ซางคำ ไผ่มาดาอย และไผ่ลิตโตเพียเป็นไผ่เสริม
- 12 ธ.ค. 2546 – 11 ม.ค. 2546 จะกินไผ่ซางคำเป็นหลัก เริ่มจะกินไผ่ตงลดน้อยลง
- 12 ม.ค. 11 ก.พ. 2546 ยังคงกินไผ่ซางคำเป็นหลัก และเริ่มจะกินไผ่รวกบ้าง
- 12 ก.พ. – 11 มี.ค. 2546 เปลี่ยนมากินไผ่บงใหญ่เป็นหลัก และกินไผ่รวกลำบ้าง
- 12 มี.ค. – ปัจจุบัน กินไผ่บงใหญ่เป็นหลัก โดยกินไผ่มาดาอยและไผ่ลิตโตเพียเสริม

- หมีแพนด้า สามารถกินไผ่ได้ทุกชนิดในโลกนี้ ขึ้นอยู่กับความชอบของหมีแพนด้าแต่ละตัว
- หมีแพนด้าที่อยู่นอกประเทศจีน ล้วนแต่กินไผ่ท้องถิ่นของประเทศนั้นๆได้ดี โดยที่ไม่จำเป็นต้องนำเข้าไผ่จากประเทศจีน

หมีแพนด้าที่ Sandiego Zoo สหรัฐอเมริกา กินไผ่ชนิดต่างๆ ดังนี้

- *Phylostachys aurea*
- *Phylostachys nigra*
- *Phylostachys bambusoides*
- *Bambusa glaucescens*
- *Bambusa textilis*
- *Bambusa ventricosa*
- *Bambusa vulgaris*
- *Bambusa oldhami*
- *Bambusa tuldoides*
- *Fargesia fungosa*



หมีแพนด้าที่ Ocean Park ฮองกง กินไผ่ชนิดต่างๆ ดังนี้

- *Dendrocalamus latiflorus*
- *Bambusa vulgaris schrader cv. "wamin" (Brandis)*
- *Bambusa striata varie*
- Golden bamboo
- *Pseudosasa hindsii*

- การที่หมีแพนด้าสามารถกินไผ่ท้องถิ่นของไทยได้เป็นอย่างดี อาจเป็นประโยชน์ต่อการดำรงเผ่าพันธุ์ของหมีแพนด้าในประเทศจีนได้ หากในอนาคตไผ่ป่าของจีนออกดอกรวมตายพร้อมกัน ไทยก็สามารถส่งไผ่ท้องถิ่นของไทยไปดำรงชีพหมีแพนด้าที่จีนได้

BAMBOO PRODUCTS : ONE OF THE OUTSTANDING OTOPS

Wanchai Ratchadamat

Director, Industrial Promotion Center Region 1, Chiangmai

The value-added of any products must be based on the concept of ***smart enterprise***. OTOP stands for One Tambon One Product or One Village One Product, originally initiated by Oita town of Japan.

The first bamboo products to be counted as OTOP of Chiangmai are bamboo lantern (made of bamboo branches) and bamboo blinds. These products are derived from local knowledge of the people of Ban Pa Bong in Sarapee district and regarded as one of the nine outstanding OTOPs of Chiangmai.

There are two famous villages of outstanding OTOPs in Chiangmai : Ban Pa Bong and Ban Tawai. The people of Ban Pa Bong are keen in making very fine bamboo handicrafts while those of Ban Tawai are very good at wood carving. Each village has a typical entity of the arts and skills inherited from former generations. The products sold in set will have more value-added.

The experience from participation in the exhibition in Milan Fair, Italy, confirms a good potential of the European market where many customers were impressed with the arts of our products. The products must represent the local culture and knowledge. The philosophy of OTOP consists of 3 important components, *i.e.*, local knowledge, local raw material, and local employment. The success of OTOP is indicated by outputs, outcomes, impacts, and sustainability.

Bamboo is raw material of high quality with great potential for value-added if designed and processed appropriately. The entrepreneur of bamboo furniture on Nimmanhemintara Road in Chiangmai sets the price of Pai Hok (*Dendrocalamus hamiltonii*) furniture as a ***smart enterprise***, *e.g.*, the price of one set of bamboo furniture can be as high as 100,000 Baht. The entrepreneurs from southern Thailand and from Prachinburi province have also participated in the fairs in other countries and received the orders for their products.

The value-added of OTOP can be received through design, skills, and packaging. Chiangmai provincial authority has established SME (Small & Medium Enterprise) at Nong Or community and the pilot enterprise center will be established on Tung Hotel road in a near future. Packaging must be strong as it also creates the value-added to the products. A package should incorporate the following : barcode, label of Food and Drugs Authority for food products, label for Muslim food, date of production and date of expiration.

The recent World Bamboo Expo in the Spring Fair of India which included a variety of textiles and handicrafts highlighted Indian culture and Indian trend.

There is a wide range of bamboo products. We should develop various kinds of machinery to make more diversified products such as laminated bamboo, curved bamboo, bamboo partition, and a combination of bamboo and rattan like table and chair.

BAMBOO CHARCOAL AND BAMBOO VINEGAR

Nikom Laemsak

Faculty of Forestry, Kasetsart University

1. Introduction

Bamboo charcoal and bamboo vinegar are among the products derived from bamboo. Bamboo charcoal is the product of bamboo carbonized under high temperature. It is said that the inner surface of bamboo charcoal reaches 300-700 m^2 per gram and possesses the property of great absorption. Bamboo charcoal processed under very high temperature will emit far infrared ray, release minus ion, and absorb electromagnetic wave. Moreover, bamboo charcoal contains some trace elements and natural minerals such as Ca, K, Na, Fe, *etc*. Thus, bamboo charcoal is widely used in our daily life.

Bamboo vinegar is concentrated from smoke of carbonized bamboo. It contains about 80% water and when it is dehydrated the vinegar consists of 80-200 components, or 32% organic acid, 40% phenolic compound, 3% aldehyde, 5% alkone compound, 5% alcohol compound, 4% ester compound, and 5% others. Bamboo vinegar can be used as soil fungicide, plant root growth promoter and deodorizer, in cosmetics, healthy drink, medicines, *etc*. (Jinhe Fu, ifu@inbar.int). The uses of bamboo charcoal and vinegar from various references can be highlighted as follows.

2. Uses of Bamboo Charcoal

1) Bamboo charcoal is used for fuel with high calorific value. It has a good market in Japan due to a logging ban on natural forest and its superior charcoal character.

2) Bamboo charcoal helps improve the soil since it is a carrier of organic manure and micro-orgasms in the soil.

3) Bamboo charcoal can be used as the raw material for bamboo active carbon, the absorption properties of which are extremely good.

4) For medical and health care, pillows and mats with bamboo charcoal can soothe the nerves, relief backache, and reduce snoring. Bamboo charcoal also has the functions of deodorization, dehumidifier, and fungicide. Odors are remove effectively by the action of naturally produced silicic acid and the porous structure of bamboo charcoal.

5) Bamboo charcoal can be used as a water purifier, shield off electromagnetic waves, and absorber of poisonous gases. Bamboo charcoal

in drinking water removes the smell of chlorine and converts it into alkaline. Coffee, tea, and other drinks taste better when made with such water. In refrigerator, bamboo charcoal helps keep fish, meat, fruit and vegetables fresh by absorbing unwanted gases such as ethylene.

3. Uses of Bamboo Vinegar

3.1 In agriculture

1) Soil improvement
2) Insect repellent
3) Fungicide (in soil)
4) Crop growth induction and yield improvement

3.2 In livestock

1) Reduce smell and insects in livestock farm
2) Feed additives
3) Digestion improvement
4) Diarrhea relief and diarrhea prevention
5) Improve quality and reduce quantity of water in meat for better meat quality in terms of taste, color, and odor.
6) Improve quality of eggs : bigger yoke and more vitamins
7) Increase milk yield

3.3 In food and beverage processing

Bamboo vinegar is a wonderful food dosage for insect repelling, antibacterial, freshness keeping and fumigant. Bamboo vinegar has high active value of SOD that can eliminate active acid ingredients in body, especially those caused by exhaustion, smoking, over-eating, old aging. Bamboo vinegar contains rich minerals and trace elements. It is said that bamboo vinegar drink can strengthen the function of humah internal organs, revivify body cells, reduce the body adipose tissue, preventing aging, and relief the symptom of liver disease and diabetes.

3.4 For cosmetic and medicine

Bamboo vinegar contains over 200 ingredients, all being natural compounds. It has no infection effect so it can sterilize the skin and easily permeate and bring nutriment to deep tissue of skin while acetic acid can soften skin cuticle. So, bamboo vinegar has a wonderful effect for skin care and can cure dermatosis, itch, athlete's foot, *etc.*

ถ่านไม้ไผ่และน้ำส้มไม้เพื่อสุขภาพและสิ่งแวดล้อม

Bamboo Charcoal and Bamboo Vinegar for Health and Environment

นิคม แหลมสัก
สาขาวิชาวิทยาศาสตร์และเทคโนโลยีทางไม้
คณะวนศาสตร์ มหาวิทยาลัยเกษตรศาสตร์
25 มีนาคม 2547

บทนำ

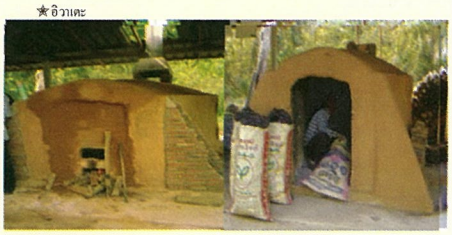
- ที่มาและความสำคัญ
- จำแนกผลิตภัณฑ์
  - ถ่านดำ
  - ถ่านขาว
  - น้ำส้มไม้ดิบ
  - น้ำส้มไม้กลั่น

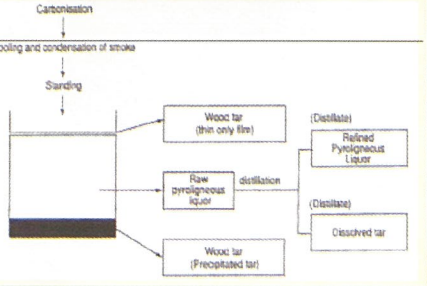
การผลิต

- ชนิดของเตาเผาถ่าน
  - Drying Carbonizer

การผลิต

- ชนิดของเตาเผาถ่าน
  - อิวาเตะ





Pyroligneous Liquor and Wood Tar

องค์ประกอบน้ำส้มไม้

- ✓สารที่เป็นอัลกอฮอล์ : Methanol, Butanol, Amylalcohol
- ✓สารที่เป็นกรด: Acetic acid, Formic acid, Propionic cid, Valeric acid
- ✓สารที่เป็นกลาง : Formaldehyde, Acetone, Furfural, Valerolactone
- ✓สารประเภทฟีนอล: Guaiacol, Syringol, Cresol, Phenol
- ✓สารพื้นฐานอื่น ๆ : Ammonia, Methylamine, Pyridine

Judgement on Quality of Pyroligneous Liquor

- ✓pH paper
  - -pH value of around 3.0
- ✓Specific Gravity
  - -around 1.010-1.050
- ✓Color
  - -pale yellow, bright brown or reddish brown color
- ❖Odour
  - -the peculiar smoky odour
- ❖Dissolved Tar Content
  - - not more than 3%
- ❖Ignition residue
  - - by weight is normally not more than 0.2%

Transparency

คุณสมบัติของน้ำส้มไม้ที่มีคุณภาพดี

	น้ำส้มไม้	น้ำส้มไม้ที่กลั่นแล้ว
pH	1.5-3.7	1.5-3.7
ความถ่วงจำเพาะ	1.005	1.001
ความเป็นกรด	1-18%	1-18%
สี	เหลือง น้ำตาลแดงจาง น้ำตาลแดง	ไม่มีสี เหลืองจาง น้ำตาลแดงจาง
ความใส	ใส	ใส
สารแขวนลอย	ไม่มี	ไม่มี

(กำหนดโดย สมาคมน้ำส้มควันไม้ญี่ปุ่น กุมภาพันธ์ 2547)

คุณสมบัติของน้ำส้มไม้ (1)

	น้ำส้มไม้ a)	น้ำส้มไม้จากไผ่ b)
PH	3.62	2.96
ความถ่วงจำเพาะ	1.01	1.011
กรดอินทรีย์	3.21	3.02
น้ำมันดาร์ที่ละลายได้	0.61	0.56
เมธานอล	0.18	0.22
กรดอะซิติก	3.03	2.58

ทำให้เป็นถ่านโดยใช้เตาเผาถ่านค้า

a) Konara (Quercur serrata) b) Mosochiku (Phyllostachys pubescens)

คุณสมบัติของน้ำส้มไม้ (2)

	น้ำส้มไม้ a)	น้ำส้มจากไม้ไผ่ b)
PH	3	3.1
สารอินทรีย์	3.48	3.43
น้ำมันดาร์ที่ละลายได้	0.33	1.8
กรดอะซิติก	4.1	2.3
กรดฟอร์มิก	0.06	0.18
เมธานอล	0.29	0.21
ฟอร์มแอลดีไฮด์	0.0008	0.0006
ฟีนอล	0.013	0.055
โอ-เครซโซล	0.005	0.12
เอ็ม-เครซโซล	0.003	0.004
พี-เครซโซล	0.002	0.004

ทำให้เป็นถ่านโดยใช้เตาเผาถ่านค้า

a) Konara (Quercur serrata) b) Mosochiku (Phyllostachys pubescens)

การใช้ประโยชน์ถ่านไม้ไผ่และน้ำส้มไม้จากไผ่

✓พลังงาน

การใช้ประโยชน์ถ่านไม้ไผ่และน้ำส้มไม้จากไผ่

✓เครื่องสำอาง

การใช้ประโยชน์ถ่านไม้ไผ่และน้ำส้มไม้จากไผ่

✓การเกษตร

การใช้ประโยชน์ถ่านไม้ไผ่และน้ำส้มไม้จากไผ่

✓ยาและสุขภาพ

การใช้ประโยชน์ถ่านไม้ไผ่และน้ำส้มไม้จากไผ่

✓สิ่งแวดล้อม

การใช้ประโยชน์ถ่านไม้ไผ่และน้ำส้มไม้จากไผ่

✓ของตกแต่งบ้าน

BAMBOO INDUSTRY AND ITS MARKET POTENTIAL

Wicharn Ruechuroj

VC Bamboo Industry Ltd., Part., Maesod District, Tak

With more than 10 years of experience from timber logging and saw milling, the Company had shifted to bamboo-based industries producing cocktail sticks, chopsticks, and bamboo mat board with 600 workers in the beginning and 200 workers nowadays. The company has developed new bamboo products, beginning with photo frames for export to USA, with more diversified designs as well as bamboo furniture for export.

Mainland China has been a main competitor in the world market with new products and rapid product development. India and Vietnam are becoming a strong competitor in global bamboo market. There are 4 prominent factors in bamboo industry.

1) **Raw material** : There should be a regular flow of raw material the whole year round. Source of raw material must not be too far. Bamboo raw material must be suitable to industry, *e.g.*, Pai Tong (*Dendrocalamus asper*), Pai Sang (*Dendrocalamus strictus*), and raw material must not be too expensive.

2) **Property and structure** of each bamboo species.

3) **Processing technology** : Good processing technology is very important and machinery must be suitable to bamboo processing.

4) **Raw material treatment** : Bamboo raw material should be treated with preservatives to avoid insect and fungal attacks. Moisture content should be lass than 12%, higher moisture content will cause undesirable effects, *e.g.*, twisting, crooking, painting difficulty, molding.

The entrepreneurs of bamboo industry should keep in mind the following issues.

1) The bamboo raw materials purchased are of the whole culms of different sizes. No one can buy all bamboo culms of only particular size. Thus, it is important to make an effective use of bamboo raw materials.

2) Materials at different portions of culm are of different thickness and strength, there should be a management for the whole and efficient use of bamboo raw materials, *i.e.*, rhizome, culm, branch, leaf, saw dust and other wastes.

3) Bamboo products are of fine and beautiful works and of large volume of production, number of workers and their skills are the key factors in producing bamboo products of required quantity and quality in time.

4) The entrepreneurs must know and understands about legislation to comply with all laws and regulations relating to bamboo.

Therefore, entrepreneurs of bamboo industry must possess a good vision on modern industry development. They must be able to invent new designs, do what the others cannot do or do some thing different from the others. The products to be released to the market must be superior but not too expensive. Thai entrepreneurs should focus at medium- and high-level market and pay less attention to lower market where the Chinese products dominate. Thus, we must place an emphasis on bamboo products for which visualizing and touching can sense the superiority of the product quality of both design and strength.

OPEN DISCUSSION

Question

I trimmed the clumps of Pai Rauk Dam (*Thyrsostachys oliverii*) in similar manners as suggested by Mr. Samniang, but with post-trimming culms of 1 meter tall. Why there has not been any new shoot during the past 2-3 years?

Answer

Mr. Samniang : Over trimming may be a main cause as remaining individual culms have very limited physiological function and cannot produce enough supply to enhance sprouting capacity of the clump. However, other factors may yield a supplementary effect as well. From my experience, appropriate trimming will help improve growth performance of bamboo.

Dr. Songkram : It seems as if trimming of this intensity were clear cutting since the remained 1-meter high culms may be regarded as the stumps from which the products from physiological function are not sufficient to support growth performance. It is therefore suggested that few culms be remained uncut to perform sufficient physiological function of the clump. In common practice, all 1- and 2-year-old culms are left for future growth.

Question

Major sources of bamboo in Thailand are protected areas and national forest reserves, what are the appropriate management practices ?

Dr. Songkram : First of all, I would like to point out that both shoot and culm production of bamboo can be achieved through appropriate management. Harvesting of shoots and culms can be practiced with control of harvesting time. Good example is in case of Kanchanaburi where bamboos are in protected areas and forest reserves, harvesting being illegal. However, there are more than 2,000 people harvesting bamboo shoots every day during rainy season, June to October. One person can harvest 50-100 kg of bamboo shoots making 100-200 Baht per day. These shoots are steamed, pickled, dried, some being sent to market as fresh shoots. Although harvesting is illegal, it is impossible to stop 2,000 people. The forestry authority negotiates with shoot processing entrepreneurs to stop purchasing bamboo shoots during mid rainy season to allow bamboo to recover from harvesting. This is a management strategy with flexibility that may be adopted for practice in other areas as well.

Mr. Samart : Natural bamboo stands on highland are very dense from which local people harvest only culms at the outer portion of the clump. The remaining dense clumps are susceptible to be destroyed by forest fire. The local people should be encouraged to participate in bamboo resource management and allowed harvesting bamboo under particular restrictions.

Question

What is Pai Chiang Kham as mentioned in Mr. Samniang's presentation?

Answer

Mr. Samniang : I named this bamboo by the name of its local habitat, Chiang Kham district, from which I brought the planting stock to grow on my farmland. Pai Chiang Kham is one kind of Pai Ruak similar to Pai Liang, *i.e.*, straight culm, long internode, beautiful appearance.

Dr. Songkram : I assume Mr. Samniang's Pai Chiang Kham is Pai Ruak Dam (*Thyrsostachys oliveri*). This bamboo species is cultivated as bamboo farm by farmers in Pua district, Nan province. The harvested culms are transported to Chonburi, Samut Sakorn and Samut Songkram provinces for used in fisheries, mussel cultivation in particular, and as far as to the south for use as a bar for rubber sheet seasoning.

Question

What are the differences between black charcoal and white charcoal in terms of uses, chemical properties, prices and market ?

Answer

Dr. Nikom : Black charcoal is produced in Iwata Kiln under 550 - 600°C. It is used for fuel, soil improvement, and plant nourishment. White charcoal is used for active carbon made under 1,100-1,200°C and stop burning when temperature is at peak. White charcoal contains plenty of trace elements such as K, Mn, Ca. It is used in the process of producing mineral water. The price of white carbon ranges from 100 to 300 Baht compared with 15-20 Baht in case of black charcoal briquette. The markets are both local and overseas.

Question

Can white charcoal absorb chemicals in fruits and vegetables ?

Answer

Dr. Nikom : White charcoal can effectively absorb chemicals in fruits and vegetables and chlorine in water.

Question

What are the properties of bamboo used in the factory ?

Answer

Mr. Wicharn : Pai Tong has coarse fiber while Pai Ruak has fine fiber with high strength. We must use every part of every bamboo species available in the factory whether it is Pai Ruak, Pai Rai, or Pai Tong. Bamboo factory is just like a tailor shop where the tailor must make beautiful dresses from cloths of any kinds and colors available in the stock.

Branches and twigs can be used for decoration while bottom part of culm for strong parts. Details of bamboo properties can be reviewed from various publications, particularly those of RFD.

Question

We have beautiful furniture, why exporting is very limited ? Don't foreign markets trust our efficiency of bamboo protection and our skills ? Why there is no booth of bamboo products at Export Promotion Center in Bangkok ?

Answer

Mr. Wichan : I have exported 90% of the products from my factory. The markets are still good. Overseas customers always ask about protection from borer insects. We can manage the insect problems in bamboo using our own techniques, but mold and fungi are still our serious problems. I can guarantee that our products are borer-free products. It might be costly to bring the bamboo products to Export Promotion Center since we have to pay about 20,000 Baht for a 3 x 3 m^2 booth.

Question

Please give more information about bamboo and the pandas.

Answer

Mr. Sophon : We need bamboo for food of the pandas for the next 10 years. This will rely on bamboo scientists to find more species suitable for food and bamboo growers to supply bamboo of both quantity and quality.

TECHNICAL SESSION[1)]

1) Only abstracts are included.
Full papers are available in Final Technical Report

BAMBOO PROTECTION

Paiwan Lek-u-thai, Arunee Veenin and Mayuree Jitkaew

Royal Forest Department, Bangkok 10900

The aim of this research was to solve the problem of insect damage and decaying of bamboo. The relationship between starch content and insect damage was also studied. Another objective was to investigate the possibilities for bamboo protection in rural area by simple methods which determine the effectiveness of various treatments for protecting bamboo culms, bamboo slivers and sticks by using non-chemical and chemical treatments. The project emphasized on low health hazardous chemical preservatives for furniture parts and alternative natural chemical preservatives for protecting bamboo slivers and sticks like Calotropin solution, neem seed solution and Stemona solution.

In case of non-chemical treatment, fresh bamboo culms were immersed in stagnant water for various periods of time. After 12 months exposure in field condition, the immersion for 2 months was adequate to prevent insect damage and fungi infestation. The starch content of bamboo culms depleted after immersing in stagnant water. However, the decrease in insect infestation was correlated with various factors such as species, moisture content and culm age.

For chemical treatment of dry bamboo culms, the immersion in 5% Timbor solution for 24 hours was the most effective for insect prevention while mixture of 0.05% Antiborer and 0.5% Antiblu could prevent deterioration by fungi.

In laboratory test, treatment of soaking bamboo slivers and sticks showed the effectiveness of some natural chemical preservatives against insect but they could not prevent fungi in moist condition.

Key words : bamboo, deterioration, discoloration, immersion, mold, natural chemical preservative, powder-post beetle, sap displacement, soaking

DEVELOPMENT OF BAMBOO UTILIZATION FOR WOOD SUBSTITUTION

Vallayuth Fueangvivat and Piyawade Bauchongkol

Royal Forest Department, Chatuchak, Bangkok 10900

The study included five bamboo species : Pai Tong (*Dendrocalamus asper* Backer), Pai See Suk (*Bambusa blumeana* Schultes), Pai Sang (*Dendrocalamus strictus* Nees), Pai Rai (*Gigantochloa albociliata* Munro), and Pai Liang (*Bambusa* sp.). Three pretreatment of bamboo cement boards were applied, i.e., non-soaking, 12-hour, and 24-hour water soaking. The boards composed of 30 to 70 parts by weight of bamboo flake and Portland cement with 60% water and 3% calcium chloride. The boards were 12 mm thick with the density of 1,200 kg/m^3.

The results of the study revealed that the pretreatment did affect the properties of bamboo cement boards, while the combinations of bamboo species and pre-treatment showed an influence on physical and mechanical properties of the boards. Nonsoaking pretreatment of Pai Tong, Pai See Suk, Pai Sang, and Pai Rai demonstrated poor properties of the boards as far as poor setting and thickness spring back were concerned. On the contrary, pretreated boards with 12-hour and 24-hour soaking showed a good improvement of the properties with slight difference. However, bamboo cement boards from Pai Liang with three pretreatment had no significant difference in properties. It is therefore recommended that bamboo cement boards from Pai Liang be made without any pretreatment, 12-hour soaking pre-treatment being needed in case of other four bamboo species.

Keywords: *Dendrocalamus asper* Backer, *Bambusa blumeana* Schultes, *Dendrocalamus strictus* Nees, *Gigantochloa albociliata* Munro, *Bambusa* sp., pretreatment, bamboo cement board

DEVELOPMENT OF BAMBOO SHOOT INDUSTRY

Charin Techaphan

Faculty of Agro-Industry, Chiangmai University

The study covered three main topics : survey of raw material, development of new products, and analysis of commercial potential of shoot products from five species of bamboo, *i.e.*, Pai Liang, Pai See Suk, Pai Tong, Pai Sang, and Pai Rai. Bamboo shoot raw material basically composes of 88.80% moisture, 3.90% protein, 0.50% fat, 1.10% mineral salt, and 5.70% carbohydrate. Moisture, protein, and fat contents were the criteria for selection of raw material in this study.

Processed bamboo shoots commonly found in local and overseas markets are canned shoots, pickled shoots, dried shoots, and powdered shoots. Thus, new products should be diversified to avoid the competition with these processed shoots. It was found that bamboo shoot production in Chiangmai province was as high as 14 tons per day with the prices ranging from 7 to 10 Baht/kg.

The criteria for bamboo shoot product development were product value-added, market potential, use of mass raw material, appropriate technology, and long shelflife. Technologies for bamboo shoot processing could be **vacuum deep-fry** (commonly used for snack production such as potato chips), **dehydration**, and **frozen freezing**. These technologies are commonly used in food processing, but not yet for bamboo shoots. The production of commercial sterile bamboo shoots began with cleaning and chopping of the shoots followed by cleansing in hot and cold water in order to avoid discoloration caused by reactions of some enzymes. The chopped shoots were then passed through canning process. The product was used as a model to determine the business potentials. The other product was bamboo chips (crispy bamboo shoots) made by vacuum deep fry process. This kind of bamboo shoot product could have a shelflife of 6 months and maximum storage of 1 year. After 6 months the product began to be greasy with rancidity. The product samples distributed in the conference room were over 6 months old as the taste and rancidity could be sensed. This vacuum deep fry product contained only 10% oil compared with 60-80% oil in case of typical deep fry. Thus, the product would be a suitable diet for weight control. Frozen freezing process would be a better alternative for bamboo shoot processing for oil-free product.

ESTABLISHMENT AND MANAGEMENT OF BAMBOO PLANTATIONS

Prachoen Sroithongkham and Suthep Chiablaem

Royal Forest Department, Chatuchak, Bangkok 10900

The Promotion of the Utilization of Bamboo from Sustainable Sources in Thailand (PD 56/99 Rev. 1 (I)) set the experiment on bamboo management by carry on the internal technical report No. 1 "Review of Bamboo Management" by Kowit Sombun, the management consultant. Five bamboo species (*Bambusa* sp., *B. blumeana*, *Dendrocalamus asper*, *D. strictus*, and *Gigantachloa albociliata*) were included in the study of the effects of spacing, culm management and agroforestry system on culms and shoots production.

The results showed that *B. blumeana* has highest productivity and survival percentage at this stage followed by *G. albociliata* and *D. strictus* respectively.

With respect to test the appropriated spacing of bamboo for highest production, the results were difference in each bamboo species. The 8 x 4 m spacing was appropriate for *Bambusa* sp., *B. blumeana* and *D. strictus*, 8 x 8 m for *D. asper*, and 4 x 4 m for *G. albociliata*.

The sustainable management of *B. blumeana* and *D. strictus* for culm production should be done by harvesting all culms at age 3 years or older from the clump for optimum production and good culm quality. But for *G. albociliata* harvesting the culms must be done between 1 and 3 years old not older than those otherwise the productivity will be reduce and sustainable production can not be obtained.

Key words: *Bambusa* sp., *Bambusa blumeana* Schult., *Dendrocalamus asper* Back, *Dendrocalamus strictus* Nees, *Gigantachloa albociliata* Munro, sustainable management

GROUP DISCUSSION

GROUP 1
CULTIVATION, MANAGEMENT, AND PROMOTION

1. General Status of Bamboo Resources in Thailand

1.1 Bamboo currently under utilization is mainly from natural forests.

1.2 Pai Tong is the main species cultivated in eastern and northeastern parts of the country under the promotion of the Department of Agricultural Extension. The total area of Pai Tong farms in this regard is over 200,000 rai.

1.3 Cultivation and utilization of Pai Sesuk has been taken place in the Uthai Thani province.

1.4 Pai Ruak is commonly cultivated on farmlands and paddy bunds, and as a plantation in some places e.g. Pua district in the Nan Province.

1.5 The area of bamboo plantations in southern Thailand is still relatively small compared with those in other parts of the country.

1.6 Existing bamboo resources cannot fulfill the demand for utilization.

2. Utilization

2.1 Industrial uses

2.2 Household uses

2.3 Ornamental planting and landscape gardening

2.4 Living fence

2.5 Environmental conservation

3. Cultivation

3.1 Practices are the same in both public and private sectors.

3.2 Bamboo cultivation under the promotion program should be close to industries.

3.3 Promotion of bamboo cultivation should include Pai Rai, Pai Tong, Pai Liang, Pai Sesuk, Pai Saang, Pai Bong, and Pai Ruak.

3.4 Site selection for bamboo cultivation should be based on the existing species in the area and ecological conditions e.g. Pai Tong and Pai Hok, which require high moisture.

3.5 Generally, bamboo grows in dry areas.

4. Propagation Techniques

4.1 Conventional propagation from seeds; a low cost method RFD uses for bamboo seedling production.

4.2 Culm cutting

4.3 Branch cutting

4.4 Rhizome cutting

4.5 Micro propagation or tissue culture

5. Production of Planting Stocks

5.1 There is a shortage of planting stocks.

5.2 There are 100 forest nursery centers/stations under RFD, each of which can produce 500,000 seedlings per year. Production of Pai Ruak and Pai Saang seedlings can be incorporated into these forest nurseries.

5.3 The current budget is not sufficient for vegetative propagation, such as culm cutting, rhizome cutting and branch cutting. If the government could budget the means, RFD could produce more planting stocks by vegetative propagation.

5.4 Academic institutions and military units can help promote the production of bamboo planting stocks.

5.5 Planting stocks of Pai Tong and Pai Sesuk should be produced by private sectors, farmers in particular, as this could generate a substantial income.

6. Management

6.1 Management of bamboo in natural forests

6.1.1 Strict control of bamboo harvesting should be adopted in order to avoid over-exploitation.

6.1.2 Some young shoots in a clump should be left for future growth, and there should be a time limit for shoot harvesting.

6.1.3 Local people should be involved in the management of natural bamboo forests.

6.2 Management of bamboo plantations

Protocol of bamboo plantation management has already been adopted by farmers.

7. **Promotion** (Public relations and information dissemination)

7.1 Promotions by the project were rather limited. Only 2,000 copies of the technical papers were produced which is not sufficient for distribution.

7.2 There must be better cooperation between the various sectors, such as the RFD, the Department of Agricultural Extension, academic institutions and military units for the production and planting of stocks and other studies.

7.3 The transfer of technology on bamboo production has not yet reached the private sector.

7.4 Training should focus on visits to successfully managed bamboo plantations and natural bamboo forests.

8. **Problems and Obstacles**

8.1 The price of bamboo is based on those being harvested from the forest; cultivated bamboo cannot compete.

8.2 There is a shortage of planting stocks for the commercial plantation establishment.

8.3 Production costs at Pai Tong plantation are still high, compared with that of China, and therefore the products are not competitive in the international markets.

8.4 The amount of raw material available is inadequate to fulfill the demand, such as the case for Pai Saang in toothpick production. This is despite a high volume of overseas orders.

8.5 There is a lack of cooperation among agencies concerned.

8.6 Bamboo plantation establishment is unsuccessful because private sectors have not received sufficient information.

9. **Recommendations**

9.1 The government should provide more budget means for planting stock production.

9.2 There should be support for farmers to produce planting stocks on a commercial scale.

9.3 The strategy on the transfer of assets to capital by the government should be materialized in order to promote the bamboo plantation establishment.

9.4 There should be an organization within the central committee to set the strategy for sustainable development of bamboo resources. Local organizations should actively participate with this committee.

10. Strategy for Bamboo Resource Development in Thailand

The following agencies and organizations should be involved in bamboo development.

- Ministry of Natural Resources and Environment
  - Royal Forest Department
  - Department of National Parks, Wildlife and Plant Conservation
- Ministry of Agriculture and Cooperatives
  - Department of Agriculture
  - Department of Agricultural Extension
- Ministry of Education
  - Universities
  - Agricultural Colleges
- Ministry of Defense
  - Military units
- Ministry of Interior
  - Tambon Administration Organizations
- Ministry of Justice
  - Department of Corrections
- Community Organizations

GROUP 2
UTILIZATION TECHNOLOGY AND MARKETING

1. Development of Production Technology

1.1 Bamboo protection

1.1.1 Chemicals are commonly used in bamboo protection, which can cause serious problems for the products which are for export.

Measures : 1) Bamboo must be treated with durable and standard natural substances.
2) There must be more research done on bamboo protection from insects and possible solutions.

1.1.2 Markets in Europe and America prefer bamboo products without chemicals.

Measures : There should be joint efforts between public and private sectors to conduct an integrated research with financial support from the government and donor agencies.

1.1.3 There is no systematic compilation and collection of data and therefore information about bamboo protection and research findings have not been disseminated to stakeholders.

Measures : 1) A Database on bamboo protection should be established.
2) The Technology Transfer Center should be established.
3) Research topics should be stakeholder-oriented.

1.2 Product design and new innovation

1.2.1 Product design normally can only be found in big companies with high investment and a high volume of production.

Measures : Government agencies should support private entrepreneurs to help match product designs with the appropriate markets.

1.2.2 Product designs are not relevant to customer's desires.

Measures : There should be a contest on product designs in order to create new concepts and new products.

1.2.3 Bamboo furniture is bulky for transport, therefore export furniture should be the knockdown sort.

Measures : There should be research done on knockdown bamboo furniture for small entrepreneurs.

1.2.4 Thailand has an advantage in filling the demand of the customers for small volume of products.

Measures : The government should enhance the capability of the entrepreneurs through training, excursions and study tours for the improvement and development of product designs.

1.2.5 Production innovation must be considered along the same lines as the innovation of raw materials. Markets for bamboo products are on a high-level, and must compete with plastic products.

Measures : Considerations should be placed primarily on utilization and marketing.

2. Marketing Strategies

2.1 Marketing depends on the designs and the quality of the products.

Measures : Standards for export products should be established.

2.2 E-commerce has become the common tool for marketing.

Measures : 1) The collections of bamboo products should be available via the internet.

2) Bamboo products should be brought to international trade fairs and exhibitions.

2.3 Furniture currently is the largest bamboo product.

Measures : Product diversification should be initiated.

2.4 Product designs do not represent Thai culture.

Measures : The designs should be culturally oriented in order to show case Thailand's excellence in fine arts and culture.

2.5 Markets in each country prefer particular product designs.

Measures 1) Conduct market research on consumer behavior and tastes in particular countries.

2) New design and product diversification should be initiated.

2.6 Data and information concerning consumers and markets are not very well distributed.

Measures : 1) There should be information made available on markets, consumer demand, and production technology on the internet and in print.

2) A network for further communication and information dissemination should be established.

3. Problems, Obstacles, and Measures

3.1 Some products need to go through a very complicate process of law and regulations for export, which impairs the growth of medium size businesses and new enterprises.

3.2 There are no trade prescriptions/descriptions for bamboo products. There should be prescription/descriptions for bamboo products, e.g. Forest Certification, Green Labeling, Eco-labeling etc.

3.3 There are a number organizations dealing with bamboo, such as the RFD and others, but no one is directly responsible for bamboo's utilization. A central body should be established as a coordinating unit among organizations for marketing purposes. This would assist the RFD, universities, the Department of Export Promotion and the Department of Industrial Promotion.

3.4 There are data conflicts among governmental agencies. It is recommended that existing data be revised and that a bamboo database be established and a designated unit assigned to provide a one stop service.

3.5 Since there is no centralized place for the collection of bamboo products for the consumer, it is recommended that bamboo manufacturers establish a one-stop market, e.g. bamboo street. The standards of bamboo products also needs to be established.

GROUP 3
LAWS AND REGULATIONS

1. Bamboo growing on private land can be harvested and transported without restrictions, however, a certificate of origin is required for its exportation or mobilization.

   Measures : 1) The local RFD office should issue a certificate of origin when requested.
   2) RFD should collaborate closer with the Customs Department for the export of bamboo and its products.

2. Bamboo is described by law as a timber, permission from the RFD and the Ministry of Industry is required upon the establishment of a bamboo processing factory. All standards must comply with the Forest Act of B.E. 2484.

   Measures : Laws and regulations must be revised in cases of bamboo harvesting, transport, processing and export.

3. Registration of forest plantation in accordance with Forest Plantation Act of B.E.2535 should include bamboo plantations and bamboo on farmlands.

4. A ban on the export of bamboo charcoal should be lifted in order to enable farmers and entrepreneurs to produce it for export.

CONCLUSIONS OF THE CONFERENCE

1. The 3-day Conference on Sustainable Development of Bamboo Resources was held at Chiangmai Phucome Hotel during 24-26 March 2004. The Conference was jointly organized by the Royal Forest Department (RFD) and the International Tropical Timber Organization (ITTO) and attended by 200 participants from various disciplines and expertise including policy makers, forestry officials, researchers, academics, bamboo growers/users, representatives from handicraft and industrial sectors.

2. The Conference consisted of the following sessions :

   2.1 Official opening;

   2.2 Panel discussion;

   2.3 Oral presentation;

   2.4 Poster presentation;

   2.5 Group discussion;

   2.6 Exhibition;

   2.7 Excursion; and

   2.8 Closing session.

3. The excursion was taken place on the first day of the Conference, 24 March 2004. The excursion program included the visits to bamboo plantation in the area of the Royal Project at Pang Da, Queen Sirikit Botanical Garden, Ban Pa Bong Luang Bamboo Weaving Group, and Chiangmai Zoo (the Pandas and bamboo).

4. The second day of the Conference, 25 March 2004, was set for 3 sessions.

   4.1 Official Opening of the Conference

   1) Opening Report
   Mr. Chatchai Ratanophat
   Director General, Royal Forest Department

   2) Opening Address
   Dr. Plodprasop Suraswadi
   Permanent Secretary,
   Ministry of Natural Resources and Environment

   3) Keynote Remarks
   Dr. Kwan Ok Ma
   Projects Manager, International Tropical Timber Organization

4.2 Panel Discussion

Panelists : 1) *Attractiveness of bamboo and local knowledge for development of bamboo products*

Mr. Bhuthorn Bhumathana
Associate Professor
Rajabhat Thepsatri University, Lopburi

2) *Bamboo : A new alternative for farmers*

Mr. Samniang Sriwichai,
Farmer, Chiangdao District,
Chiangmai Province

3) *Bamboo and the pandas*

Mr. Sophon Damnui
Director-General
The Zoological Park Organization under the Royal Partonage of H.M. the King

4) *Bamboo products : One of the outstanding OTOPs*

Mr. Wanchai Ratchadamas
Director, Industrial Promotion CenterRegion 1,
Ministry of Industry

5) *Bamboo charcoal and bamboo vinegar*

Dr. Nikom Laemsak,
Assistant Professor
Faculty of Forestry, Kasetsart University

6) *Bamboo industry and its market potential*

Mr. Wichan Ruechuroj
VC Bamboo Industry Ltd., Par.t,
Maesod district, Tak

Moderator : **Dr. Songkram Thammincha,**
Associate Professor
Faculty of Forestry, Kasetsart University

4.3 Oral Presentation

Chairman : **Dr. Bunvong Thaiutsa,**
Associate Professor
Faculty of Forestry, Kasetsart University

Presentation : 1) *Bamboo protection*

Miss Paiwan Lek-u-thai
Forest Economic and Forest Products Research Office

2) *Development of bamboo utilization for wood substitution*

Mr. Vallayuth Fuengvivat
Forest Economic and Forest Products Research Office

3) *Development of bamboo shoot industry*

Dr. Charin Techaphan
Faculty of Agro-Industry, Chiangmai University

4) *Establishment and management of bamboo plantations*

Prachoen Sroithongkham
Forest Economic and Forest Products Research Office

5. The program on the third day of the Conference, 26 March 2004, consisted of the following activities.

5.1 Group discussion

Group 1 : Cultivation, management, and promotion
Group 2 : Technology, utilization and marketing
Group 3 : Laws and regulations

5.2 Closing ceremony

1) Report from the Organizing Committee

Mr. Suchart Thaipetch
Project Director

2) Closing address

Mr. Pairoaj Punpugdee
Acting Deputy Director General

CLOSING REPORT

by

Mr. Suchart Thaipetch

Projects Director, RFD/ITTO Project PD/56/99 Rev. 1(I)

Mr. Pairoaj Punpugdee, Acting Deputy Director General of Royal Forest Department,

On behalf of the Organizing Committee and the participants, I would like to express my sincere thanks and appreciation for your participation in the closing ceremony of the National Conference on Sustainable Development of Bamboo Resource of Thailand. The activities and the outcomes of the conference can be summarized as follows.

The Royal Forest Department organizes this Conference with financial support from the International Tropical Timber Organization (ITTO). This Conference lasted for three days, 24-26 March 2004, is attended by 200 participants from both public and private organizations comprising of administrators, scientists, entrepreneurs, farmers, community leaders, and individuals who are interested in bamboo. Main events of the meeting consist of field excursion to Ban Pabong Luang handicraft group, the Royal Project at Pang Da, Queen Sirikit Botanical Garden, and Chiangmai Zoo; panel discussion on cultivation and utilization of bamboo by experts of different fields; and group discussion. Poster presentation and exhibition are also included.

The group discussion is focused on sustainable development of bamboo resources for which the participants are split into three groups to discuss about the future directions of sustainable development of bamboo resources. Three main issues are included in group discussion :

Group 1 : Cultivation, management, and extension;
Group 2 : Utilization technology and marketing; and
Group 3 : Laws and regulations.

The representative of each group presents the details and conclusions from the discussion and proposes the important steps for the Royal Forest Department to take further actions.

I am pleased to inform you that we have highly successful conference with active participation and suggestions and recommendations from the meeting are very useful to future development of bamboo industry. May I take this opportunity to cordially invite you to officially close this conference.

CLOSING ADDRESS

by

Mr. Pairoaj Punpugdee

Acting Deputy Director General, Royal Forest Department

The Project Director, Resource Persons, Participants, Distinguished Guests, Ladies and Gentlemen,

I have a pleasure and honor to be a chairman of the official closing of the National Conference on Sustainable Development of Bamboo Resources in Thailand. First of all, I would like to thank all of you for your participation and very useful suggestions for future development of bamboo resources.

The panel discussion was full of important contents presented by the knowledgeable and experienced panelists with very constructive questions and comments from the floor, while problems and obstacles, particularly laws and regulations, in cultivation and utilization of bamboo were seriously discussed among the members of group discussion. The results and suggestions from group discussion are very useful to the further steps for bamboo resource development. I am very glad to learn that the Royal Forest Department receives a valuable cooperation from both public and private sectors in organizing this important meeting. The contributions from the resource persons as well as from the participants are gratefully appreciated. I am absolutely sure that the knowledge and outcomes of this conference will be a crucial basis for sustainable development of our precious bamboo resources.

I would like to thank all members of the organizing committee and staff for their tireless efforts, as well as all participants for active participation and contribution during the entire course of this conference.

I now declare the National Conference on Sustainable Development of Bamboo Resources in Thailand close and wish you all a good health and a good success with your carrier and have a safe and sound journey back home.

Thank you.

LITS OF PARTICIOANTS

Achara Lisudtrukai	Bureau of Cottage and Handicraft Industries Development, Department of Industrial Promotion, Bangkok 10110
Achara Teerawattananon	National Science Museam, Klongha, Klongluang, Patumtani 12120
Aek Chaisri	Chiang Rai Provincial Forest Office, 798 Singhakli Rd., Muang, Chiangrai 57000
Anajuk Punvasa, Maj.	Kavilla Military Camp, Muang, Chiangmai 57000
Anake Suksawat	Loei Provincial Forest Office, Muang, Loei
Anan Anantachot	Faculty of Forestry, Kasetsart University, Bangkok 10900
Anan Promdontree	Protected Areas Management and Administration Office 11, Wangchan Rd., Muang, Pitsanulok 65000
Anirut Puttapong	FIO, Salawin Plantation, Maeyoum, Maesariang, Maehongson
Anon Thapanual, Maj. Gen.	Third Army Area Command, Muang, Pitsanulok
Anuchart Buranapimp	Industrial Promotion Center Region1, Chiangmai 50000
Anuchart Supanya	Uttaradit Provincial Forest Office, 19 Padwa Rd., Ta-it, Muang, Uttraradit
Anun Puntusavad	Royal Project Suan Chitralada, Rachaburi
Anun Toviriyavate	Loei Provincial Forest Office, Muang, Loei
Anurak Teralertvenai	National Park, Wildlife and Plant Department, Phaholyothin Rd., Bangkok 10900
Anusit Mathavararag	Chumporn Provincial Forest Office, Muang, Chumporn
Apichart Jindamongkol	FIO, Maelee Plantation, Maetuen, Lee, Lumphun
Apisit Ama	Maejo University, Chiangmai 50290
Arayun Boonsang	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Arunee Pusodsavang	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Arunee Veenin	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Bavornsak Pejaranonda	King Momgkut's University of Technology, Thonburi, Prachautit Rd., Thungkru, Bangkok 10140
Bhuddhinan Bhuengwongyart	135/2 M. 4, Moosee, Pakchong, Nakhonratchasima 30130
Bhuthorn Bhumathana	Rajabhat Theepsatri University, Muang, Lopburi
Boonnark Kleebchumpee	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Boonsong Sompho	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Boonyong Sureephong	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Bullop Dityam	Chiangmai

Bunchoue Jomkomsi	FIO, Danlanhoy Planyation, Wangtakor, Bandanlanhaoy, Sukhothai
Bunnum Thongchattu, Sgt.	Third Army Area Command, Chiangmai
Buntoon Wongkeaw	Doi Sutep-Doi Pui NationalPark, Chiangmai
Bunvong Thaiutsa	Faculty of Forestry, Kasetsart University, Bangkok 10900
Chainarong Onpun	Surin Natural Resources and Environment Provincial Office, Nogmuang, Muang, Surin 32000
Chakorn Kunkaew	Chiang Mai Zoo, 100 Huaykaew Rd., Muang, Chiangmai 50200
Chaluasak Makshou	Maehongson Natural Resources and Environment Provincial Office, Khunluangprapas Rd., Muang, Maehongson 58000
Chamnong Boon-ung	Lopburi Provincial Forest Office, Muang, Lop Buri 15000
Chanchai Nuvari	FIO, Muangtak Plantation, Nabod, Muang, Tak
Channarong Jindatham	Yodnamjai Ltd. Part., 274 M. 1, Junjavatai, Maejan, Chiangrai 57270
Channin Trisuriyatumma	Sala-tanum Co. Ltd., 161/299 Jarunsanitwong Rd., Bangkunsri, Bangkoknoi, Bangkok 10760
Charin Techaphan	Faculty of Agro-Inustry, Chiangmai University, Chiangmai 50000
Chatchai Kanjanakot	Reforestration Office, RFD, Bangkok 10900
Chatchai Rattanophat	Royal Forest Department, Bangkok 10900
Chatree Vachiraphadejseuk	Yala Provincial Forest Office, Betong, Muang, Yala
Chavalit Urapeepatanapong	Planning and Information Division, RFD, Bangkok 10900
Chawladda Teangpook	Institute of Food Research and Products Development, Kasetsart University, Chatuchak, Bangkok 10900
Chockchai Suasawathee	Pang-nga Provincial Forest Office, Muang, Pang-nga 82000
Choodej Koonprakum	102 M. 6, Chiangdao, Chiangdao, Chiangmai 50140
Chor Pongroongsup	Royal Forest Departmant, Bangkok 10900
Chuchat Tepsut	Sakonnakhon Provincial Forest Office, Muang, Sakonnakhon
Chukiat La-ong-phon	Yala Provincial Forest Office, Betong, Yala
Danai Nilkuha	Pang-nga Provincial Forest Office, Muang, Pang-nga 82000
Decha Chomdee	Nakhonsawan Provincial Forest Office, Goseetai Rd., Paknumpo, Muang, Nakhonsawan
Denchai Pimkinnaree	FIO, Maehad-Maekor Plantation, Maelan, Lee, Lumpoon
Direk Wongsumpun	Ranong Provincial Forest Office, Muang, Ranong
Eakanut Kajangtimaporn	King Momgkut's University of Technology, Thonburi, Prachautit Rd., Thungkru, Bangkok 10140
Gerard Dauplay	Gerard Collection Co. Ltd., 6/23-23 Nimmanhemin Rd., Muang, Chiangmai 50200
Jane Tafong	Hauynamdung Nation Park, Chiangmai
Jaree Bansiddht	Medical Plant Research Institute, Department of Medical Science, Ministry of Public Health, Nonthaburi 11000

Jarun Henpitak	Karnchanaburi Research Station, Institute of Agricultural Ecology Research and Development, Kasetsart University, Karnchanaburi
Jarus Neranatpaibun	Protected Areas Management and Administration Office 13, 140 Yantrakijkoson, Muang, Prae, 54000
Jeranuch Sukkumdoung	29/676 M. 2, Klongsam, Klongluang, Patumthani
Jirapong Kuhakanchana	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Jongrak Songrattanapan	Suratthani Provincial Forest Office, Muang, Suratthani
Jumpol Chang-in	Nakhonpanom Provincial Forest Office, Nitayo Rd., Muang, Nakhonpanom 48000
Kamnueng Kam-u-dom	Maehongson Provincial Forest Office, Panglawnikom, Jongkham, Muang, Maehongson
Kamollak Tongma	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Kamonwat Wesetsiri	Protected Areas Management and Administration Office 21, 6/2 Makrood Rd., Muang, Pattanee
Kanjanarat Thaveesuk	Institute of Food Research and Products Development, Kasetsart University, Chatuchak, Bangkok 10900
Kanogporn Antonna	Industrial Promotion Center Region 9, 65 M. 1, Samet, Muang, Chonburi
Kantapon Phakakarn	Satun Provincial Forest Office, Piman, Muang, Satun
Kasem Poopetch	Bureau of Cottage and Handicraft Industries Development, Department of Industrial Promotion, Bangkok 10110
Katesada Boonart	Kamphaeng Phet Provincial Forest Office, Muang, Kamphaeng Phet 62000
Khomsak Soparat	Nan Provincial Forest Office, Mahawong Rd., Muang, Nan 55000
Khwanchai Charoenkrung	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Kitti Puttichot	Bamboo Weaving Group, Chonburi
Kittipong Khamsogchuag	Loei Provincial Forest Office, Muang, Loei 42000
Kittisak Jindavong	Royal Project Foundation, Pangda, Chiangmai
Kom Jumpawan	FIO, Maemoh Sawmill, Bandong, Maemoh, Lampang
Komsun Chaleephol	Economic Forest Nursery Center 2, Muang, Udonthani 41000
Kosol Penpayap	203/1 Tanalai Rd., Muang, Chiangrai
Kovit Suratum	Nongkhai Provincial Forest Office, Muang, Nongkhai
Kowit Sombun	26 Tamao Rd. Weingnua, Muang, Lampang 52000
Kriangsak Sri-ngernyuang	Faculty of Agricultural Production, Maejo University, Chiangmai 50290
Krisana Rungrojwanich	Sukhothai Thammathirat Open University, Bangpood, Pakkred, Nonthaburi 11120
Kunnika Tunprasert, M.D.	Huachiew Chalermprakiat University, 18/8 Bangna-Trad, Bangplee, Samutprakarn

Ladawan Puangchit	Faculty of Forestry, Kasetsart University, Bangkok 10900
Ladda Watanasiritum	Institute of Food Research and Development, Kasetsart University, Chatuchak, Bangkok 10900
Leela Kayikananta	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Lert Chuntanaparb	Ram Intra Rd., Bangkhen, Bangkok, 10900
Malee Sriratanatum	Royal Forest Department, Bangkok 10900
Mana Jitrit	Prae Provincial Forest Office, Yantrakijkoson Rd., Muang, Prae 54000
Mana Puttichot	Industrial Promotion Center Region 9, 65 M. 1, Samet, Muang, Chonburi
Manit Wattanaphan	Sukhothai Provincial Forest Office, Pravesnakhon, Thani, Muang, Sukhothai
Mayuree Jitkaew	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Montatip Yunchalad	Institute of Food Research and Products Development, Kasetsart University, Chatuchak, Bangkok 10900
Montian Narakanta	Amnatcharoen Provincial Forest Office, Muang, Amnatcharoen
Montree Panuwattanawong	Planning and Information Office, National Park, Wildlife and Plants Department, Bangkok 10900
Mungkorn Kamolthanagul	Pitsanulok Provincial Forest Office, Wangchan, Muang, Pitsanulok 65000
Nakorn Adulvisit	Royal Project Foundation, Pangda, Chiangmai
Nantanit Kulcharoen	Dusit Zoo, 71 Rama V Rd., Dusit, Bangkok 10300
Naovarat Phromtad	FIO, MaeJam Plantation, Thapha, Maejam, Chiangmai
Napaporn Kuttiya	Banmuang Newspaper
Narongsak Yamkli	Chiang Mai Zoo, 100 Huaykaew Rd., Muang, Chiangmai 50200
Naruebaet Chumthong	Pattani Provincial Forest Office, Paknum Rd., Rusamilae, Muang, Pattani
Nataleya Siriphocakit	K.V.M. 5555 Industry Limited, 3 Soi Patthanakan 28, Patthanakan Rd., Suanluang, Bangkok 10250
Nattaporn Rukbumrung	Suratthani Provincial Forest Office, Muang, Suratthani
Nikom Laemsak	Faculty of Forestry, Kasetsart University, Bangkok 10900
Nipat Sivatintugo	Para Rubber Agricultural Product Extension and Management Department of Agriculture Extension
Niphol Anukul	Provincial Forest Office, Yasothorn
Niramit Jutuma	Protected Areas Management and Administration Office 12, Pamamuang, Muang, Tak 63000
Nisakorn Simma	Rajabhat Theepsatri University, Muang, Lopburi
Nivaet Puantim	Rajabhat Theepsatri University, Muang, Lopburi
Niwat Jampathong	Reforestration Office, RFD, Bangkok 10900
Nongnut Seajia	Kalasin Provincial Forest Office, Maung, Kalasin

Noppadon Jarassamrit	Faculty of Agricultural Production, Maejo University, Chiangmai 50290
Nuanprang Chaitakhob	Institute of Agricultural Ecology Research and Development, Kasetsart University, Bangkok 10900
Nuch Pisamayarom	Protected Areas Management and Administration Office 2, 16 Sukumwit Rd., Sriracha, Chonburi 20110
Nuchanart Nilkamheang	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Nut Watkaew	Phanthong Health Farming, 99 M.8, Papang, Jareonmuang, Pan, Chiangrai
Ongart Khanutwong	Chainat Provincial Forest Office, Promprasert Rd., Muang, Chainat
Orathai Chuntakul	Chiang Mai Zoo, 100 Huaykaew Rd., Muang, Chiangmai 50200
Orathai Saenkumlor	Faculty of Agricultural Technology, King Mongkut's Institute of Technology, Ladkrabang, Bangkok 10502
Oungkaruk Rittirut	Nakhonnayok Provincial Forest Office, Suwannason Rd., Muang, Nakhonnayok
Padungsak Jantarat	Songkla Zoo, 109 M. 5, Kaorupchang, Muang, Songkla 90000
Pairoj Wardkean	Supan Buri Provincial Forest Office, Muang, Supan Buri
Paiwan Lek-u-thai	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Pajon Sitdhigun	Chiangmai Provincial Forest Office, Charoenprates Rd., Muang, Chiangmai 50000
Pakorn Wongping	The Forest Indystry Organization (FIO)
Pannee Denrungruang	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Phuchong Insomphun	Lampoon Provincial Forest Office, Muang Lampoon
Pinit Soralump	Kamphaeng Phet Provincial Forest Office, Muang, Kamphaeng Phet
Pipat Kaetdee	Nakhonsawan Provincial Forest Office, Goseetai Rd., Paknumpo, Muang, Nakhonsawan
Pirin Chokpisansup	Amnatcharoen Provincial Forest Office, Muang, Amnatcharoen
Piroaj Punpugdee	Royal Forest Department, Bangkok 10900
Pisut Wasinamakin	FIO, Kaokana Plantation, Chondan, Phetchabun
Piti Kantangkul	Department of Agricultural and Resource Economics, Kasetsart University, Chatuchak, Bangkok 10900
Pitoon Joraden	Protected Areas Management and Administration Office 19, Prangein, Muang, Nakhonsrithammarat 80000
Pitsanu Khorboot	Faculty of Science, Kasetsart University, Bangkok 10900
Piyawadee Bauchongkol	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Pongsak Bunpa	Prae Provincial Forest Office, Yantrakijkoson Rd., Muang, Prae 54000

Pongsi Summano	91 M. 11, T. Meana, Chiangdao, Chiangmai 50170
Ponsak Todsieng	Maeto National Park, Chiangmai
Poolsiri Chuchip	Institute of Agricultural Ecology Research and Development, Kasetsart University, Bangkok 10900
Pornchai Duriyapunt, Col.	Kavilla Military Camp, Muang, Chiangmai 57000
Pracha Tongna	Industrial Promotion Center Region 1, 158 Thunghotel Rd., Muang, Chiangmai
Prachakphong Thaiklang	National Park, Wildlife and Plants Department, Phaholyothin Rd., Bangkok, 10900
Prachoen Sroithongkham	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
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Praphun Tanakitrungraung	Planning and Information Division, RFD, Bangkok 10900
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Prasart Kaewmuangmoon	Maehongson Natural Resources and Environment Provincial Office, Khunluangprapas Rd., Muang, Maehongson 58000
Prasertsak Buntrakunpuntawe	Chiang Mai Zoo, 100 Huaykaew Rd., Muang, Chiangmai 50200
Prataes Punyowat	Provincial Industry Office, Udornthani
Prayont Salaivong	503 M. 3, Sampraw, Muang, Udonthani 41000
Preecha Chalermpichai	Forest Nursery Center, Chiangmai
Preecha Sritaveep	Udonthani Provincial Forest Office, Srisuk Rd., Muang, Udonthani
Preechan Samart	Protected Areas Management and Administration Office 11, Wangchan Rd., Muang, Pitsanulok 65000
Preeda Prommakorn	Industrial Promotion Center Region10, Theprattanakawee Rd., Umpradoo, Muang, Suratthani
Prong Soongsak	FIO, ChaipraKarn Plantation, Maetalop, Fang, Chiangmai
Pugdee Premsri	261/1 M.7, Tungkaowpuang, Chiangdao, Chiangmai
Punja Pupetch	Bureau of Cottage and Handicraft Industries Development Department of Industrial Promotion, Bangkok 10110
Rachen Phummaphum	Lampoon Provincial Forest Office, Muang Lampoon
Rampueng Vetchayanwut	Kirinahkon Co., Ltd., 265 Chamthawee Rd., Hangchat, Lampang
Ranoo Sridee	Bureau of Cottage and Handicraft Industries Development Department of Industrial Promotion, Bangkok 10110
Ranoo Tonggam	10 M. 8, Bangchaocha, Pothong, Angthong 14120
Ratchanee Chanpet	Kaokeiw Open Zoo, 235 M. 7, Bangpra, Sriracha, Chonburi
Rathaphon Sribuapuan	Faculty of Agricultural Production, Maejo University, Chiangmai 50290
Rattana Pakchotanon	Rajabhat Theepsatri University, Muang, Lopburi
Rawat Pimsarn	FIO, Tapla Plantation, Phaluad, Tapla, Uttaradit

Renoo Suwanarat	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Ritti Gingtupluang	FIO, Mae Umlong Plantation, Toongraungtong, Mealanoi, Chiangmai
Ronnakiat Singin	Tak Natural Resources and Environment Provincial Office, Phaholyothin Rd., Muang, Tak 32000
Rung Sunpakaew, Maj..	Third army Development Battalion, Chiangmai
Sahha Toolapong	Faculty of Agricultural Production, Maejo University, Chiangmai 50290
Sakchai Potisuvun, Col.	Kavilla Military Camp, Muang, Chiangmai 57000
Samai Buahong	106 M. 2, T. Salika, Muang, Nahkonnayok 26000
Saman Na Lumpang	Royal Project Foundation, Pangda, Chiangmai
Samart Sumanochitraporn	Forest Nursery Center (Chiangrai), Wildlife and Plants National Park Department
Samphan Meesith	Bureau of Community Forest Management, RFD, Bangkok 10900
Sangdow Chundee	85 M. 10, T. Kogkram, Bangplama, Supanburi 72150
Santi Sekularb	Nakhonpanom Provincial Forest Office, Muang, Nakhonpanom 48000
Sanun Prommanomai	Nakhonnayok Provincial Forest Office, Suwannason Rd., Muang, Nakhonnayok
Saruntorn Sukwatnijakul	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Satapon Prashaming, Staff Sgt.	47 M. 1, Muangna, Chiangdao, Chiangmai
Savad Duangrathoradee	FIO, Maehorpra Plantation, Maehorpra, Meatang, Chiangmai
Senee Namjaisook, Lt. Col.	Phayao Provincial Thai Army, Phayao
Seree Sangchantr	Protected Areas Management and Administration Office 2, 16 Sukumwit Rd., riracha, Chonburi 20110
Sirilak Phatphong	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Siriluck Suwannakum	Lumpang Provincial Forest Office, Wiengnua, Muang, Lumpang
Somchai Jarusampangit	Royal Forest Department, Bangkok 10900
Somdej Jumpee	Forest Nursery Center 2, Bankamgling, Muang, Udonthani
Somjai Monnamon	M. 2, T. Salika, Muang, Nahkonnayok 26000
Somjai Srimongkoltip	Regional Community Forestry Training Center for Asia and the Pacific, Kasetsart University, Bangkok 10900
Somjit Manerut	510 M. 10, Muang-ngai, Chiangdao, Chiangmai 50200
Somkid Soparatana	Phetchabun Provincial Forest Office, Muang, Phetchabun
Somkid Yamprasert	3/23 M.5, Ban Mongkratae, Takradan, Srisawad, Kanchanaburi 71250
Somnuek Boonyuen	National Park, Wildlife and Plants Department, Phaholyothin Rd., Bangkok 10900

Sompop Samuthjinda	Narathiwat Provincial Forest Office, Prachasongkroh Rd., Muang, Narathiwat 96000
Sompop Thitawasun	Faculty of Agricultural Technology, King Mongkut's Institute of Technology, Ladkrabang, Bangkok 10502
Somporn Chaicharus	Reforestation Center 4, Bangyai, Muang, Nakhonratchasima 30000
Somsak Khuenkaew	Maehongson Provincial Forest Office, Ppanglawnikom Rd., Chongkum, Muang, Maehongson
Somsuk Greetaton	Protected Areas Management and Administration Office 4, Cha-um, Phetchaburi
Songkram Thammincha	Faculty of Forestry, Kasetsart University, Bangkok 10900
Songsak Vitayaudom	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Sophon Dumnui	The Zoological Park Organization under the Royal Partonage of H.M. the King, Rama 5 Rd., Bangkok 10300
Sopon Leelathanapipat	Waso Co. Ltd., 79/68 M. 2, Sammakon Village Soi 4, Samwa Rd., Bangchan, Klongsamwa Bangkok 10510
Sopon Tipmontri	FIO, Maelukmuan Plantation, Banluang, Mae-ai, Chiangmai
Srisawat Rhienmora	Saraburi Provincial Forest Office, Pagprew, Muangsaraburi, Saraburi
Suchart Kullayawongsa	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Suchart Pongcestakun	Uthaithani Provincial Forest Office, RukkarndeeRd., Muang, Uthaithani
Suchart Thaipeth	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Suchart Yimmee	FIO, Maemai Plantation, Banlang, Muang, Lampang
Sudsakorn Suksoong	Lumpang Natural Resources and Environment Provincial Office, Pakham Rd., Huawieng, Muang, Lumpang 52000
Sumai Maiman	Lumpang Provincial Forest Office, Wiengnua, Muang, Lumpang
Sumniang Sriwichai	451 M. 2, Muangngay, Chiangdao, Chiangmai 50170
Sungkom Juntrarathum, Maj. Gen.	Third Army Area Command, Pitsanulok
Suntaya Sriparaya	Doi Sutep-Doi Pui NationalPark, Chiangmai
Suntorn Samansukumal	Suratthani Provincial Forest Office, Muang, Suratthani
Suparaek Intrakul	24/2 Jaroenrat Rd., Gudchong, Muang, Loie
Supart Salarat	Chanthaburi Provincial Forest Office, Watmai, Muang, Chanthaburi
Supasit Chunchauvarit	Protected Areas Management and Administration Office 4, Cha-um, Phetchaburi 76120
Supat Bunmeeprasert	Chaiyaphum Provincial Forest Office, Muang, Chaiyaphum
Supavit Ngernnak	Pattalung Provincial Forest Office, Ramaes Rd., Kuhasawan, Muang, Pattalung
Supin Boonyakan	18 Sukothai Rd., Soi 9, Dusit, Bangkok.

Suporn Jungkina	Sukhothai Provincial Forest Office, Pravesnakhon, Thani, Muang, Sukhothai
Supot Paerdpring	Protected Areas Management and Administration Office 4, Cha-um, Phetchaburi 76120
Suprecha Supakijaruk	Udonwanit Shop, Nongbua Market, Muang, Udonthani 41000
Surachai Pokamanee	Protected Areas Management and Administration Office 4, Cha-um, Phetchaburi 76120
Suraphon Bumrungsuk	207/1 M. 10, Banmaipattana, Post Box 34, Maechan Chiangrai 57110
Surapong Anuchon	Sakonnakhon Provincial Forest Office, Muang, Sakonnakhon
Surasak Suksomboon	Chiangthai Tradding Ltd., Part., 22/2 M. 2, Soi Judsanthahanrua, Bangkok
Suratchai Inwises	FIO, Khunmaekummee, Huayrong, Rongkwang, Prae
Surin Numprasert	Chiangdao Nation Park, Chiangmai
Sutep Chiablaem	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Suwan Pongjaroen	FIO, Srisuchanalai Plantation, Srisuchanalai, Sukhothai
Suwimol Joraden	194 M. 7, Nasan, Praprom, Nakhonsritumrat 80000
Tanapong Phŏtaen	Forest Nursery Division, Reforestation Office, RFD, Bangkok 10900
Tanongsak Anuwiya	FIO, Mae-u-kor, Maeyoumnoi, Muang, Maehongson
Tavarak Yodwong	FIO, Wangchin Plantation, Napoon, Wangchin, Prae
Tawan Somtum	78 M. 4 T. Pabong, Sarapee, Chiangmai 50140
Tawat Jirayut	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Taweesak Wattanasuntigun	Protected Areas Management and Administration Office 21, 6/2 Makrood Rd., Muang, Pattani
Teanchai Boon-ard	Prachinburi Provincial Forest Office, Namuang Rd., Muang, Prachinburi
Teera Veenin	Faculty of Forestry, Kasetsart University, Chatuchak, Bangkok 10900
Teerapon Srimora	Supan Buri Provincial Forest Office, Muang, Supan Buri
Thanaed Chunin	130 M.5, Tambon Nongharn, Amphur Sunsai, Chiangmai
Thanthat Yomkoed	Industrial Promotion Center Region 1, 158 Thunghotel Rd., Muang, Chiangmai
Thanuch Choksupanai	Lumphun
Thanuporn Supasa	Suansa and Buatong Co. Ltd., Chiangmai
Thirdpong Supaperm	Forest Nursery Division, Reforestation Office, RFD, Bangkok 10900
Thongsuk Intasee	Chiangmai Natural Resources and Environment Provincial Office, Changphuag, Muang, Chiangmai 50300
Thumrongsawat Bunjun	Songkla Zoo, 109 M. 5, Kaorupchang, Muang, Songkla 90000

Tinnakorn Piriyayotha	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Tinnakorn Sittiwong	Bureau of Community Forest Management, RFD, Bangkok 10900
Tira Jongtakun	Bureau of Community Forest Management, RFD, Bangkok 10900
Todsaporn Thongthieng	King Mongkut's University of Technology, Thonburi, Prachautit Rd., Thungkru, Bangkok 10140
Tongme Borrirak	Bannongka, M. 12, T. Nontaburi, Kabinburi, Prachinburi
Tongsok Tongsokde	279 M. 5, T. Kogkram, Bangplama Supanburi 72150
Tongsuk Makkoed, Sgt.	Kavilla Military Camp, Muang, Chiangmai 57000
Tumnoon Akarapin	Forest Nursery Center 3, Muang, Yasothorn 35000
Udom Maneekat	Community Development Department, Muang, Chiangmai 50300
Udom Omyim	203 M. 4, Muang-ngai, Chiangdao, Chiangmai 50140
Udom Tareejit	Prachaubkirikun Provincial Forest Office, Muang, Prachaubkirikun
Urairat Yamsaka	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Uthai Jongprasopchai	Hueykaew Watershede Station, Chiangmai
Vallyuth Fuangvivat	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Varaporn Doungsang	Maejo University, Chiangmai 50290
Vibul Charoenchai	FIO, Maemoh Plantation, Bandong, Maemoh, Lampang
Vichai Udomratanasilp	Surin Natural Resources and Environment Provincial Office, Nogmuang, Muang, Surin 32000
Vicharn Ruechurote	VC Bamboo Industry Ltd., Part., 367 M. 7, Measod, Tak 63110
Vinit Phoonaovarat	Protected Areas Management and Administration Office 15, Singhakli Rd., Muang, Chiangrai 57000
Virach Benjaphantawee	Samudsongkram Provincial Forest Office, Muang, Samudsongkram
Vitchanee Boonyapatipark	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Vudhikorn Khumcharoen	Private Reforestation Division, Reforestation Office, RFD, Bangkok 10900
Wanchai Ratchadamas	Industrial Promotion Center Region1, Chiangmai 50000
Wanida Subansenee	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Wannasak Rungrojwanich	National Park, Wildlife and Plants Department, Phaholyothin Rd., Bangkok 10900
Watinee Thongchet	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Weera Yakai	Protected Areas Management and Administration Office 14, Pamai Rd., Wiengnua, Muang, Lampang 52000

Weerapong Sawatwongporn	Chiangmai University, Chiangmai
Weerasak Papas	Maejo University, Chiangmai 50290
Weerawat Wathanadhirakul	Nan Natural Resources and Environment Provincial Office, Chaisatan, Muangnan, Nan 55000
Werachai Khomvacharapong	National Park, Wildlife and Plants Department, Phaholyothin Rd., Bangkok 1090
Wiharn Trirongvijit, Capt.	Senventh Infantryman Battalion, Chiangrai
Wikhan Anpanurak	Agricultural Products Institute, Kasetsart University, Chatuchak, Bangkok 10900
Winai Panyathanya	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Wirot Sdang-akrabavorn	Jutaluk Co., Ltd., Muang, Chiangmai
Wirot Theeranawe	Protected Areas Management and Administration Office 11, Wangchan Rd., Muang, Pitsanulok 65000
Wisit Kitsomporn	Doipui Research Station, Kasetsart University, Chiangmai
Withya Jeapaiboon	Chachoengsao Provincial Forest Office, Mahachukkapud Rd., Muang, Chachoengsao 24000
Wong Kaewjaima	13/1 M. 11 T. Maena, Chiangdao, Chiangmai 50170
Worapon Ittawong	Maejo University, Chiangmai 50290
Worapot Kumbai	FIO, Tungkwean Plantation, Wiengtan, Hangchat, Lampang
Woratham Oonjittichai	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Wunvisa Tong-ngam	10 M. 8, T. Bangchaocha, Pothong, Angthong 14120
Yanyong Ampawa	Faculty of Social Science and Humanities, Mahidol Salaya, Phutthamonthon, Nakhon Pathom 73170
Yanyong Kangkarn	Forest Economics and Forest Products Research Office, RFD, Bangkok 10900
Yotin Juntavee	Protected Areas Management and Administration Office 16, 153 Charoenprates Rd., Muang, Chiangmai 50000

ACTIVITIES

Opening Ceremony

Dr. Plodprasop Suraswadi
Permanent Secretary
Ministry of Natural Resources and Environment

Dr. Hwan Ok Ma
Projects Manager
International Tropical Timber Organization

Panel Discussion

Technical Presentation

Group Discussion

Poster and Exhibition

Excursion

Royal Project at Pangda

Queen Sirikit Botanical Garden

Ban Pa Bong

Chiangmai Zoo

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สำนักวิจัยการจัดการป่าไม้และผลิตผลป่าไม้ กรมป่าไม้

สนับสนุนโดย

องค์การไม้เขตร้อนระหว่างประเทศ

(International Tropical Timber Organization - ITTO)

กรมป่าไม้ 61 ถนนพหลโยธิน แขวงลาดยาว เขตจตุจักร กรุงเทพฯ 10900 โทร. 02-5799177