



Pacific Rim Vetiver Network

Technical Bulletin No. 1999/1

**Vetiver Handicrafts**

**In Thailand**

**By**

**Department of**

**Industrial Promotion**

**Royal Thai Government**

Office of the Royal Development Projects Board

Bangkok, Thailand

October 1999



## The Pacific Rim Vetiver Network (PRVN)

**Objective:** To serve the countries of the Pacific Rim as the centre to collect, compile and disseminate information on the use of vetiver in the forms of newsletter, occasional publications and homepage of the internet.

**Member Countries:** The following 22 countries, geographical situated in the Pacific Rim, are members of the PRVN: Australia, Brunei, Cambodia, Cook Islands, China, Fiji, Indonesia, Japan, Korea (Republic of), Lao PDR, Malaysia, New Zealand, Papua New Guinea, Philippines, Samoa (Western), Singapore, Solomon Islands, Taiwan, Thailand, Tonga, Vanuatu, and Vietnam.

**Scientist Members:** Scientists of the member countries of PRVN who had made prior contact with the RDPB are automatically registered as PRVN members, which at present amount to about 800. Others who want to join the Network can apply directly to its Secretariat Office. No application form is necessary. Those who are interested to apply just identify themselves with name, current position, place of work, and mailing address, e-mail address, and other information which they deem necessary.

### Activities:

**Newsletter:** An 8-page quarterly English-language newsletter under the name of VETIVERIM, has been issued, starting first number in July 1997. Its circulation is 2,000 copies for each number. It has been sent in bulk to the Country Representatives of the member countries for further distribution to scientists and institutes within the country in order to save postage and other difficulties in international mailing.

**Internet Homepage:** The PRVN has established its internet homepage which can be seen through: <http://prvn.rdpb.go.th>. Scientists of the member countries, or from other regions for that matter, are invited to submit information on new research and technologies on vetiver, especially those appropriate to the Pacific Rim countries. Information and pictures are most welcome and can be sent to the PRVN Secretariat by mail, fax or e-mail (see addresses below).

**Publications:** It has been the intention of the Secretariat to publish technical bulletins and other documents, as and when opportunity arises. A series of technical bulletin has been launched since April 1998.

### The Secretariat

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# **Vetiver Handicrafts in Thailand**

By

**Department of Industrial Promotion**

**Bangkok, Thailand**

**With contribution from Narong Chomchalow**

Edited by

**Narong Chomchalow  
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**Office of the Royal Development Projects Board**

**Bangkok, Thailand**

**October 1999**



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### ***Cover Photos: (clockwise from top left)***

#### ***"Interlaced Patterns Made from Vetiver Leaves" (with local names in brackets)***

**Front:** Running water ('Lai Nam Lai'), star-gooseberry seed ('Lai Met Mayom'), orange-jasmine flower ('Lai Dok Keo'), worm ('Lai Tua Non'), twisted ('Lai Kliao'), bullet-wood flower ('Lai Dok Phikun')

**Back:** Two strips ('Lai Song'), rice panicle ('Lai Ruang Khao'), spider web ('Lai Yai Maengmum'), Three-strip bamboo basket ('Lai Chalom Sam Sen'), melon seed ('Lai Met Taeng'), checker ('Lai Khat')



## Foreword

One of the immediate activities of the Pacific Rim Vetiver Network (PRVN) is to disseminate information on vetiver technologies, especially those which are adaptive to local conditions of developing countries in the Pacific Rim. In this connection, the Secretariat is publishing a series of technical bulletins which can provide useful information about Vetiver Grass Technology (VGT) to readers who are active members of the PRVN.

In 1998, two bulletins were published, namely "Vetiver Grass System for Environmental Protection" and "Vetiver Grass for Slope Stabilization and Erosion Control". Both have received favorable comments from our members as well as other scientists from around the world.

One of the problems in transfer of technology on planting vetiver to the farmers is the acceptance of the farmers who are not quite willing to sacrifice their limited land areas to growing vetiver, a plant that does not provide any cash income. One way to overcome this problem is to utilize the leaves, which should be cut off from the plant at regular interval to induce good growth, to make handicrafts for sale.

The Department of Industrial Promotion has been very active in promoting the utilization of vetiver leaves to make handicrafts. It has provided training on the techniques of producing wicker works from prepared vetiver leaves, and organized contests and exhibitions to promote the activity.

We strongly believe that the production of handicrafts from vetiver leaves will encourage farmers, who used to be reluctant in growing vetiver, to grow vetiver and make use of available leaves to produce handicraft products for sale, one way to earn extra income for the family.

On behalf of the PRVN, we wish to express sincere thanks to the author, in this case, the Department of Industrial Promotion, for its generous contribution. We would also like to express our sincere gratitude to Dr. Narong Chomchalow who made every effort in encouraging the Department of Industrial Promotion to prepare the original manuscript (in Thai), and who helped to compose the manuscript, including the editing and laying-out. As well, we also owe Dr. Suyanee Vessabutr of the Queen Sirikit Botanic Garden who helped to edit the manuscript on a voluntary basis.

It is hoped that this publication will be of some value to extension officers and others in the field of transfer of technology, to pass on this valuable information to the farmers and, especially the housewife groups, to start producing vetiver products, and at the same time to encourage farmers to grow more vetiver for soil and water conservation, the ultimate objective of growing vetiver.



(Dr. Sumet Tantivejkul)  
Executive Secretary, Pacific Rim Vetiver Network  
and  
Secretary-General, Chaipattana Foundation



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# **Vetiver Handicrafts in Thailand\***

*Department of Industrial Promotion  
Bangkok, Thailand*

## **1. INTRODUCTION**

In accordance with a more productive agronomic and ecological approach under ingenious initiatives of His Majesty the King, fundamentally stressing support efficient use of agricultural and natural resources, the major purpose appears to rest largely upon land stewardship, a critical factor in improving and maintaining soil resource base. This is to facilitate more productive and sustainable resource management practices that are both conservation-effective and which will provide productive returns to the farmers in spreading the benefits conducive to achieve a successful switch to sustainable agriculture. Increasingly, it is becoming evident that this type of approach can be enhanced further by building on practical application and devising new strategies through the greater use of vetiver plus a more careful and sensitive consideration of creative and active techniques underpinning effective soil and water improvement practices with a variety of needs and circumstances, particularly in steep sloping areas so critical for increasing resource productivity of production base suited to resource-poor conditions and priorities.

Still, a priority issue is how to prepare individuals to widen access to the systems practice. Though much of the effort has been centered on improving and increasing the adaptability so as to facilitate more productive and sustainable use of vetiver, in this respect, it is critical to gain the farmers confidence and interest to accept the systems strategy, and their capability to perform essential function to rehabilitate and diversify degraded lands right from the outset. As is well known, all farmers are interested in making more profits within the framework of their capital limitations and other restrictions. It is therefore important for them in making an investment in cultivating vetiver grass on their land as being worth the risk of a deviation from the past performance. In a sense, with doubts expressed regarding validity of the purpose upon which it rests to conserve soil and water or conservation emphasized, there is an in-coming question of individual economic decisions among many resource-poor farmers in being realistically expected for practical application to satisfy short-term requirements and concurrently yield a product that has more tangible economic benefits. It seems to have reluctant farmers in the concurrent needs so as to maintain the ability of the system model proven to be effective contribution to the direct increased incomes for operational decisions that have impact on what is practiced on their behalf. Nevertheless, leaves and roots of vetiver can contribute to increasing value-added products. Regularly, cuttings of leaves and culms to maintain or improve the grass growth, can be envisioned more in making greater beneficial use of the materials for roofs as well as for crafts, thereby increasing incomes. In connection to this, the Department of Industrial Promotion also supported, promoted, and organized country-wide training for the vocational group that makes products from vetiver grass. The training is on the use of vetiver leaves to make salable goods that generates extra income for the family. This is an extended program ensuing from the Commemoration of the 50th Anniversary (Golden Jubilee) Celebrations of His Majesty the King of Thailand's Accession to the Throne, in which the Department had organized Vetiver Products Contest in 1995 and Vetiver Grass Exhibition in 1996 in order to publicize the campaign for Development and Promotion of the Utilization of Vetiver Grass According to His Majesty the King's Royal Initiative.

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\* With contribution from Narong Chomchalow, Office of the President, Assumption University, Bangkok.



## 2. THE VETIVER GRASS

### 2.1 What is Vetiver Grass?

Vetiver is a kind of grass native to India and many other countries in tropical Asia. It grows into dense clumps under natural setting throughout Thailand and can withstand adverse conditions. Its clump has a diameter of about 30 cm and stands a height of 50-150 cm. The leaf is narrow and has a length of about 75 cm and width of about 8 mm, while the roots can penetrate as deep as 2 m or more. Two species occur naturally in Thailand, namely *Vetiveria zizanioides* Nash, the lowland type, known in Thai as 'Faek Lum' or 'Faek Hom'; and *V. nemoralis* A. Camus, the upland type, known in Thai as 'Faek Don'. The roots of the former species are mildly fragrant due to the presence of essential oils which can be extracted and used in perfume making. Several ecotypes of both species have been identified. The most popular ones for making handicrafts in Thailand are the four ecotypes of *V. zizanioides*, namely 'Sri Lanka', 'Kamphaeng Phet 2', 'Surat Thani', and 'Songkhla 3'.

### 2.2 Vetiver Grass Use and Utilization\*

The main objective of planting vetiver grass is to make use of the plant in soil and water conservation, especially in sloped areas. There are several other related uses of the vetiver plant such as on the farmlands, in agricultural systems, on the edges of the ponds, etc. However, planting for conservation purpose focuses on its benefits in terms of conservation which cannot be valued in terms of cash for the growers. Therefore some farmers are reluctant to accept its potential benefits.

In most Asian countries, vetiver has traditionally been utilized in many ways. The leaves, for example, have been utilized to make roof thatch, compost and mulch, etc. Its fragrant roots have traditionally been utilized to extract essential oil used as a fixative for high-priced perfumes; they have also been utilized in traditional medicines. Due to the presence of certain pesticidal compounds, its roots have been placed in the closet to repel insects. In Thailand as well as in some other countries, many new ideas have recently been added to utilize vetiver, for example, as a medium for mushroom growing, as green fuel, and as raw material for wood and concrete panels, etc. The utilization of the leaves plays a complementary role in growing vetiver for soil and water conservation purposes since the leaves are normally cut off at regular intervals to stimulate its growth. Such cut leaves can be utilized as roof thatching or in making handicrafts as a supplementary occupation to earn extra income. For further information on the various approaches in the use and utilization of the vetiver grass, the readers are advised to read the 'Guidebook on Vetiver'\*\*. The present paper, however, will concentrate only on the utilization of vetiver leaves as raw material for making handicrafts.

(Text continued on page 19)

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\* The present document attempts to distinguish between the terms 'use' and 'utilization'. The former term is employed for any direct exploitation of the vetiver plant, such as for soil and water conservation, slope stabilization, erosion control, environmental protection, etc. without having to be processed or changed into finished or semi-finished products. The latter involves some kind of processing, e.g. in making roof thatch, in oil extraction, as medium for mushroom growing, or, in the case of the present document, as raw material for handicraft making.

\*\* Published by the Office of the Royal Development Projects Board, 1999





H.R.H. Princess Maha Chakri Sirindhorn and her proud vetiver handicraft  
 - a large container made from vetiver leaves on display at the First  
 International Conference on Vetiver held in Chiang Rai, 4-8 February 1996

Vetiver handicraft on sale at  
 1st International Conference  
 on Vetiver in Chiang Rai, 4-8  
 February 1996 →



← A booth displaying vetiver  
 handicrafts at Siam Grand  
 Hall in Bangkok, 28-31  
 August 1996



## Post-harvest Treatment of Vetiver Leaves



Vetiver plants ready to be harvested (Note that the leaves should be at least 3 months old)



Cutting the leaves at 15-20 cm above ground

Immerse the leaves in boiling water for 3 min





Hang the leaf bundles in shade to allow water to drip.

Spread the bundles thinly on the platform



Place sun-dried leaves in sulfur-fumigated cabinet to prevent molding





Vetiver leaves being dried on the ground for 3 days



Selecting leaves having wide blade and no sign of damage, then remove sharp spines along the edge of lower surface with a needle

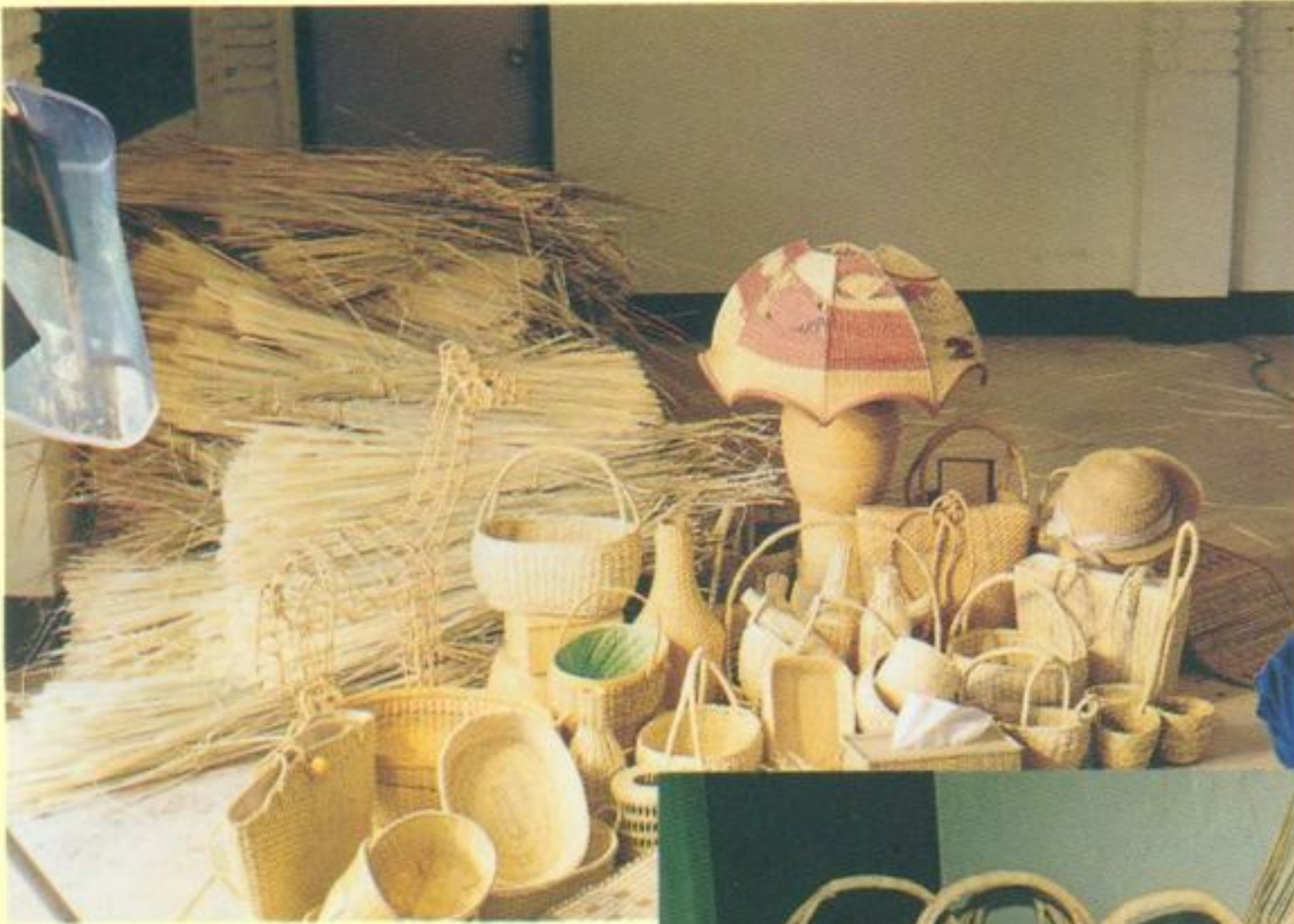


# Training on How to Make Vetiver Handicrafts





## Handicraft Products Made after Receiving Training



Prepared vetiver leaves (background) ready to be used in handicraft making with various kinds of wicker works (background)

Baskets made by newly trained members of a house-wife group, ready for sale



A display of various handicraft products made by the house-wife group





Finished products ready for sale to visitors (above)



Interlaced base of a basket, ready to set up the sides (right)



A basket in the making (left)

Vetiver leaves are weaved into a mat of checker pattern (right)







Containers of different shapes and sizes

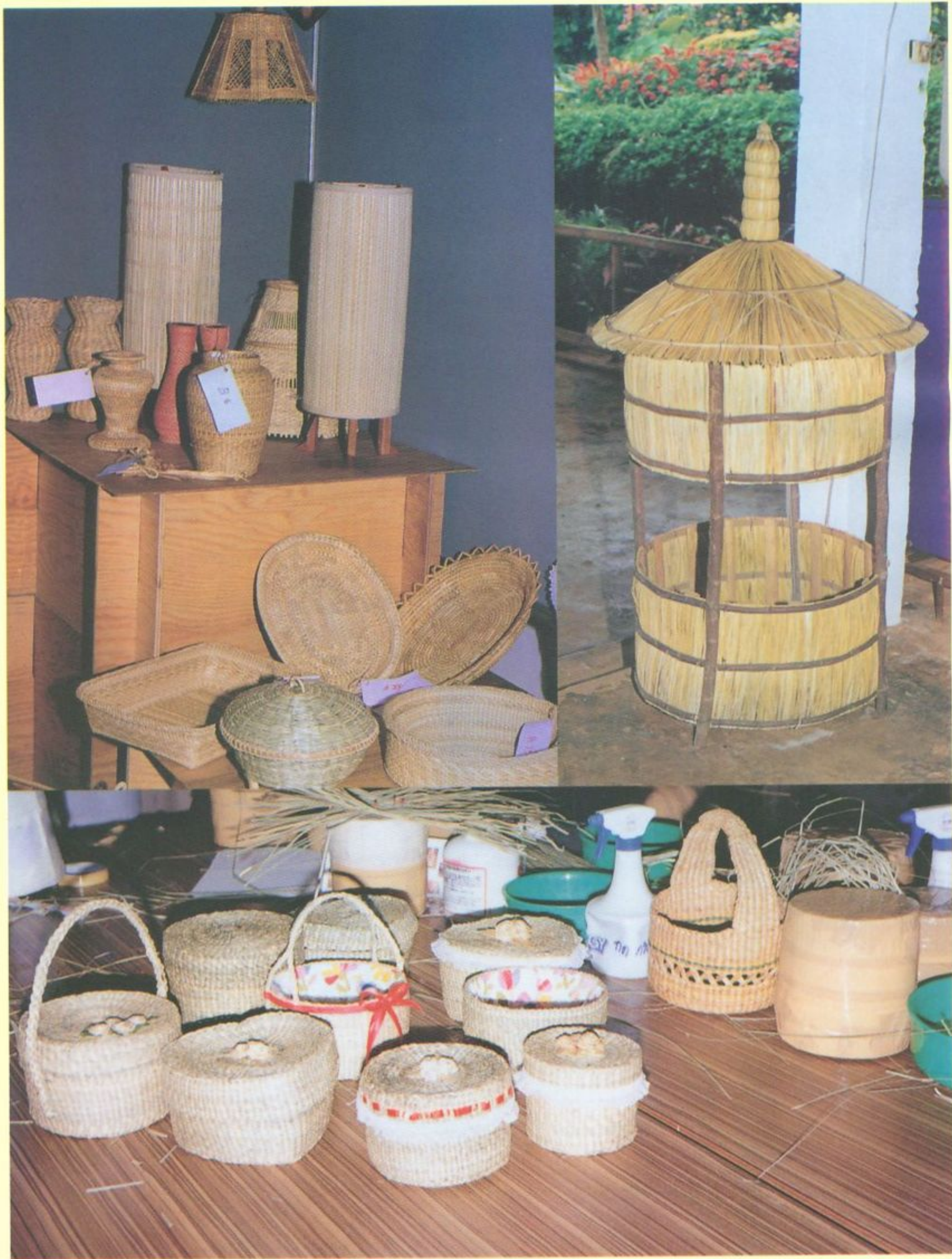




Basketry of different shapes and sizes, decorated with colored threads







Top left: lamp shades, vases, containers. Top right: a home decorating object  
Bottom: Various kinds of basketry



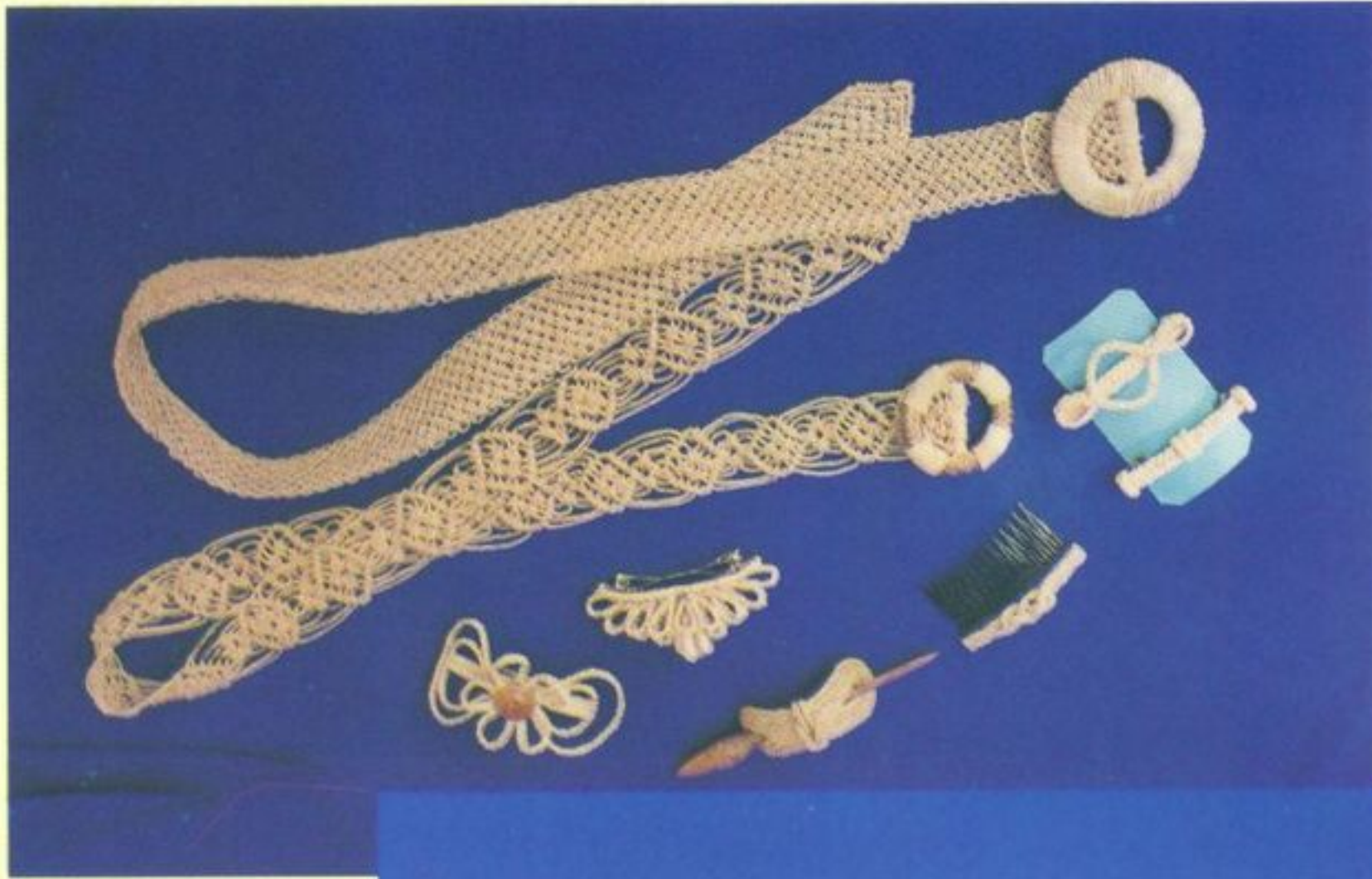


Handbags

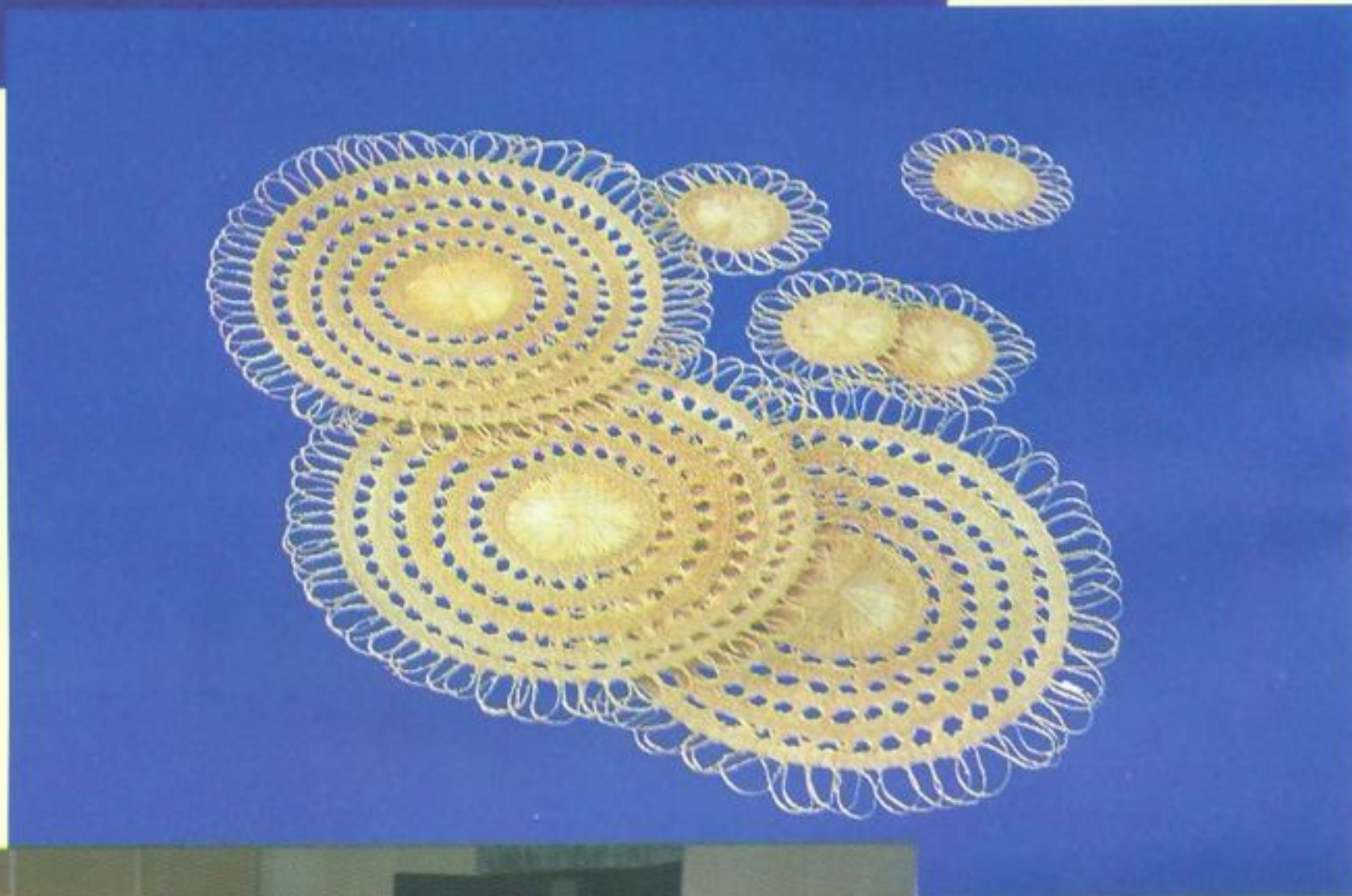


Assorted vetiver handbags





Belts and brooches



Place mats



Interior decorating objects. Foreground: mat; Top left: pot-plant containers, room partition; Right: stools





Animal figures made from vetiver leaves: Top: a porcupine;



Bottom left: a deer

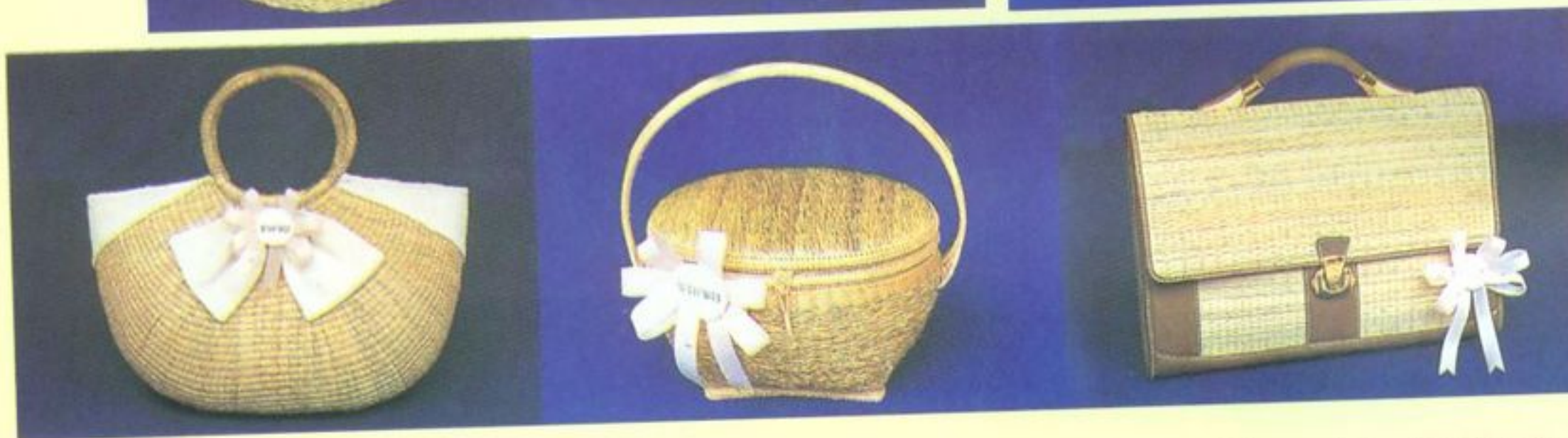


Bottom right: an elephant and a fish



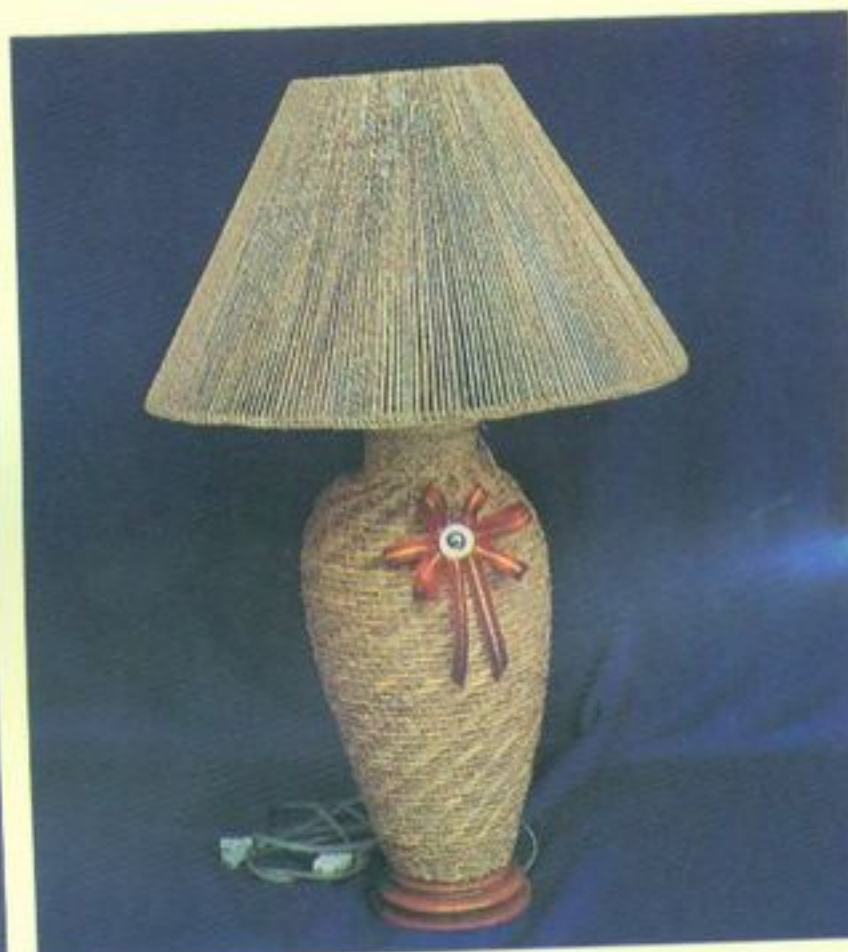
# DIP '96 Vetiver Handicraft Contest

## A. Bags



First prize (top right), Second prize (top left), Third prize (top center), Consolation prizes (bottom)

## B. Other Objects



First prize (top right), Second prize (top above), Third prize (top below), Consolation prizes (bottom)

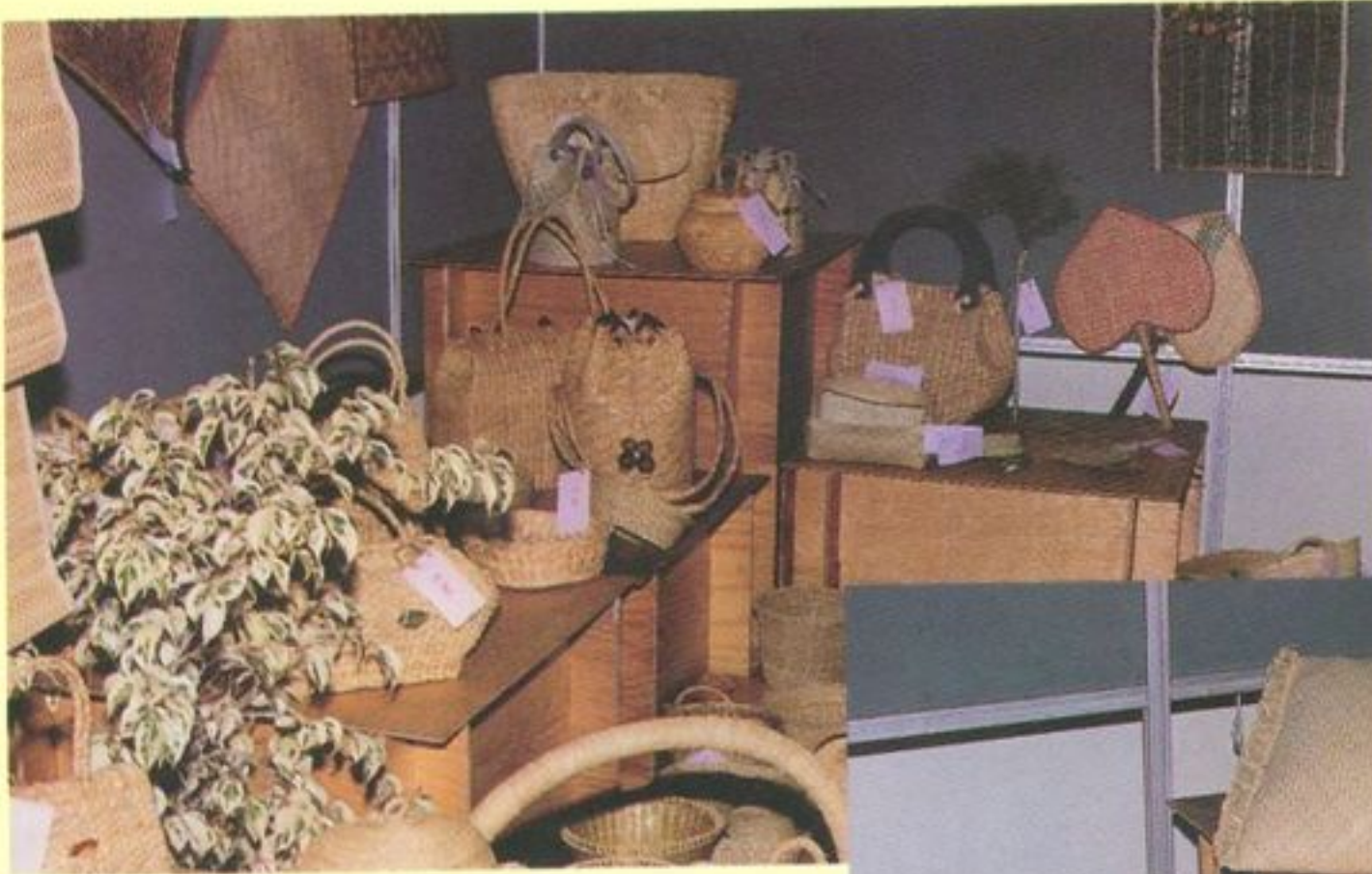


DIP '99 Vetiver Handicraft Contest and Exhibit





## The Exhibitions of Vetiver Handicrafts





### 3. PREPARATORY STEPS FOR THE UTILIZATION OF VETIVER LEAVES IN HANDICRAFT MAKING

In making handicraft products from vetiver leaves, three preparatory steps have to be carefully followed. These are:

**3.1 Pre-harvest Operation:** Vetiver leaves to be utilized for handicraft making should be at least three months old, irrespective of the age of the plant. They can come from a single hedgerow, or multiple hedgerows, or a field of vetiver planted for any other purposes, including the multiplication plots that are not used for transplanting. Normally, vetiver does not need any special care like watering, weeding, pesticide spraying, or fertilizer application. However, if such treatments are nominally provided, the leaves will be more luxuriant in growth with no sign of damage from pest attacks, and thus yield better-quality products.

**3.2 Harvesting of Vetiver Leaves:** Sickles or knives are used to harvest vetiver leaves (and culms which are considered, for the present paper at least, as part of the leaves). Cutting should be made at the distance of 15-20 cm from ground level. Cutting lower than this (e.g. 5-10 cm) will affect subsequent growth of the plant although the yield of leaves is higher. In normal situation, harvesting can be done every two to three months during the rainy season, depending on the growth of the plant. It is important to cut the leaves off before the onset of dry season to avoid fire damage during the prolonged drought period and to activate the plant to resume growth at the onset of the next rainy season. Cutting will also stimulate tillering.

The cut leaves should be spread thinly in the field to allow moisture to evaporate, at least for a few hours before they are transported to the processing area. If, for any reason, the fresh leaves are transported immediately after harvesting, extra weight of water will add to the cost of transportation, although this may be small if the amount harvested is not large.

**3.3 Post-harvest Treatment of Vetiver Leaves:** There are many methods used by different groups in Thailand in preparing harvested leaves, especially in drying; some simply spread the leaves on the floor to dry in the sun while others use the oven to dry. The followings are steps in processing the harvested leaves developed by the Department of Industrial Promotion:

- (i) Boil the leaves for 3 minutes and hang them to allow water to drip dry overnight.
- (ii) Spread the leaves thinly on the floor to dry in the sun for 3 days.
- (iii) Fumigate the dried leaves in the cabinet overnight with sulfur to prevent molding.
- (iv) Select the leaves that are long, wide, and healthy; then use a needle to rip off sharp spines along the edge of the lower surface of the leaves.
- (v) Immerse the selected leaves in the water; then wrap them with newspaper or cloth to make them soft. Such treatment makes them easy to work with, and will not break while interlacing or weaving.
- (vi) Repeat Step (iii) to make sure that mold will not attack them.
- (vii) Dye the treated leaves, either with natural dyes (such as bark, leaf, fruit, etc.), or chemical dyes to make the products colorful and attractive.

### 4. THE MAKING OF HANDICRAFTS FROM VETIVER LEAVES

Similar to other natural materials commonly used in handicrafts, vetiver leaves contain high amount of fiber, thus are ideal for wicker works. They can be utilized directly to make wicker works, or interlaced into 'basic units' of different shapes and forms before setting up to form any particular wicker works, or using looms to weave into mat. Other materials like rattan, wire, rod, wood, etc. may be used to support the forms.

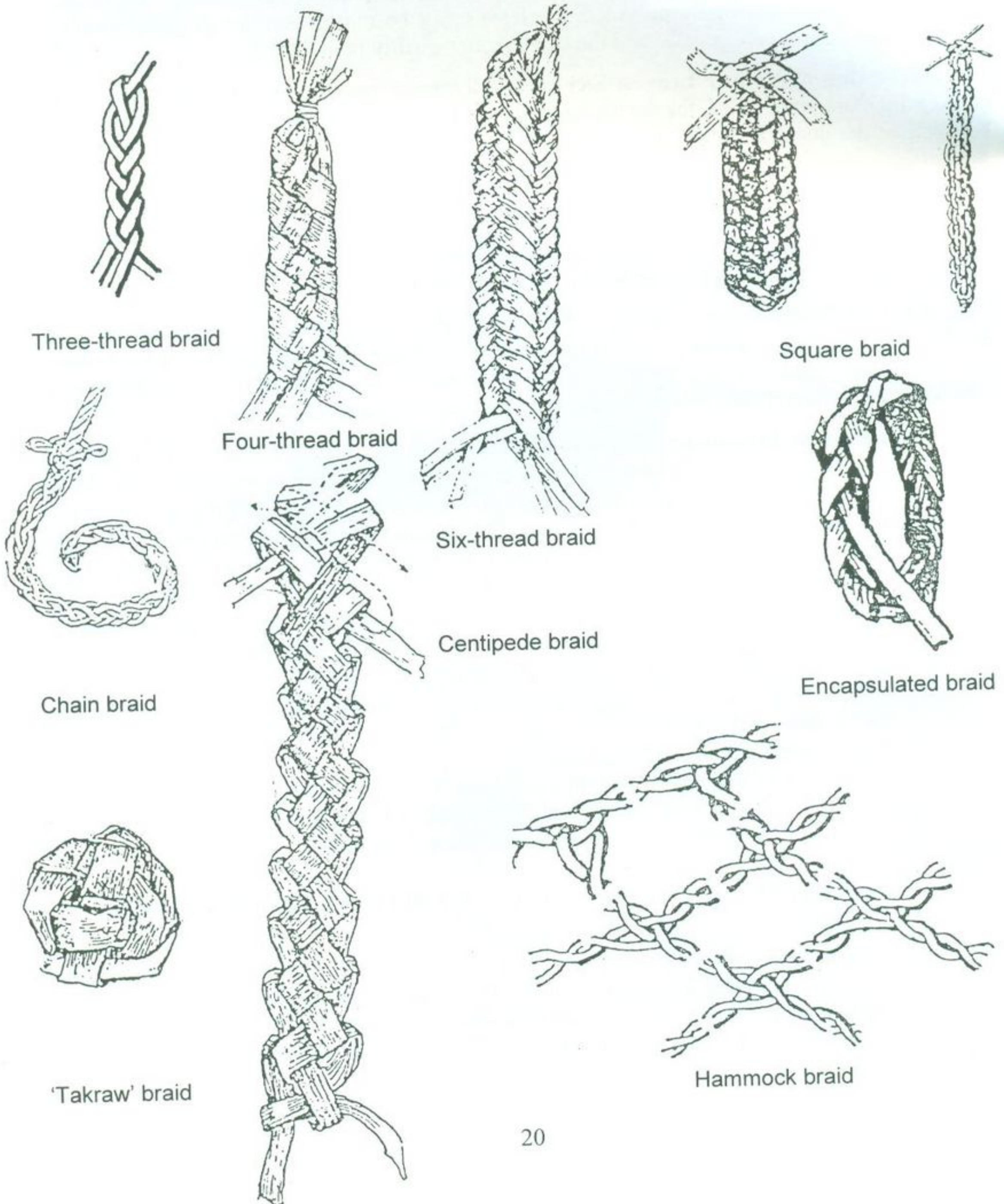


**4.1 Direct Utilization of Vetiver Leaves:** Most wicker works can be made directly from prepared vetiver leaves without having to be made into 'basic unit' (see details in section 4.2 below). These include a wide range of products from handy accessories, containers, decorating materials, home appliances, and miscellaneous objects (see details in section 5 below).

**4.2 Production of Basic Units:** Two types of basic units of wicker works can be made from vetiver leaves. These include: (i) *braids*, and (ii) *interlaces*.

**4.2.1 Braids:** Braids are formed by twisting three or more threads of natural fibers such as vetiver leaves. Various patterns of braids have been developed by Thai people (see figures below)

### Different Patterns of Braids





**4.2.2 Interlaced Patterns:** Thai people have developed various interlaced patterns whose Thai names reflect their similarity with certain natural objects or phenomena such as flowers, seeds, animals, appliances, running water, etc. They are shown in front and back covers.

## 5. TYPES OF HANDICRAFTS MADE FROM VETIVER LEAVES

Most handicrafts made from vetiver leaves are wicker works, made directly by interlacing the prepared vetiver leaves into a particular form of products, or made from braids or interlaced patterns without having to set up, like the place mat, pillow, etc. Some are, however, made by assembling braids or interlaced patterns to form an object by sewing or sticking with glue.

The Department of Industrial Promotion (DIP) has provided basic training in producing handicrafts to a number of women's groups under the supervision of various agencies such as the Department of Cooperative Promotion, the Department of Agricultural Extension, the Land Development Department, the Department of Public Welfare, the Doi Tung Development Project.

Handicraft products made from vetiver leaves can be grouped under following categories:

**5.1 Handy Accessories:** These are the most common group of wicker works made from vetiver leaves since the demand is quite high. These so-called 'handy accessories' include bags, hats, belts and brooches.

**5.2 Containers:** This type of wicker works is used to put certain objects into it. It includes: *Basketry:* Many forms, shapes, and sizes of baskets are produced, such as fruit baskets, winnowing baskets, utility baskets, wine baskets, and flat baskets or trays. *Pottery:* Such as pot-plant cases, wine-bottle case, etc. *Other Objects:* Tissue-paper boxes, utility boxes, etc.

**5.3 Decorating Materials:** Home decoration items, like wall clocks, picture frames, lampshades, dollies, animal figures, flowers, etc.

**5.4 Home Appliances:** These products are similar to home decoration objects but they are used also as appliances such as chairs, stools, room partitions, tables, etc. Mats and similar objects are also produced by weaving.

**5.5 Miscellaneous:** Such as folders, diary covers, file covers, etc.

## 6. SOCIO-ECONOMIC CONSIDERATIONS

**6.1 Benefits of Making Handicraft from Vetiver Leaves:** The following benefits are envisaged from utilizing vetiver leaves to make handicrafts:

- Earn extra income from sale of products.
- Encourage farmers to plant more vetiver and obtain indirect benefits of planting vetiver such as reducing soil erosion and enriching soil nutrients and moisture.
- Encourage farmers to cut the leaves of vetiver at regular interval, thus inducing growth of the vetiver plants and reducing the danger of fire.
- Encourage the establishment of housewife groups (or other related groups) to make productive use of their time, thereby helping the well-being of the members and encouraging their unity.

**6.2 Marketing of Vetiver Handicrafts:** Although at present vetiver handicrafts are not established products in the market in Thailand, yet they are quite well known to the public due to their publicity through mass media. The only problem is their availability in the markets. The following places are selling vetiver handicrafts:



- ◆ Narayana Phand Co. Ltd., a private undertaking of the Ministry of Industry which is well known as the country's largest Thai Handicraft Center whose main objective is to promote cottage industries which generate supplementary income to the villagers, has acted as 'Vetiver Grass Product Distributor and Design Developer'.
- ◆ Several cooperatives under the Department of Cooperative Promotion are selling vetiver products made by the members. Some of the well-known ones are:
  - Chiang Kham Women and Youth Settlement Cooperatives, Pa Sang Sub-district, Phu Sang Branch District, Phayao.
  - Occupational Training Center, Pa Mi Village, Wiang Phuang Kham Sub-district, Mae Sai District, Chiang Rai
- ◆ Doi Tung Development Project, Doi Tung, Mae Fa Luang District, Chiang Rai

## 7. VETIVER HANDICRAFT CONTESTS AND EXHIBITIONS

In order to promote the utilization of vetiver leaves in making handicrafts, the following contests and exhibitions on vetiver handicrafts have been organized:

### 7.1 The Vetiver Handicraft Contests:

**7.1.1 DIP '95 Contest:** During the Commemoration of the 50<sup>th</sup> Anniversary (Golden Jubilee) Celebrations of His Majesty the King of Thailand's Accession to the Throne, DIP organized the first 'Vetiver Handicraft Contest' on 23 August 1995. The awards were given to two categories of products, namely: (i) bags, and (ii) other objects.

**7.1.2 DIP '99 Contest:** In order to celebrate the auspicious occasion of His Majesty the King's Sixth Cycle (72<sup>nd</sup>) Birthday Anniversary (5 December 1999), DIP organized the second 'Vetiver Handicraft Contest' on 13 January 1999. The items submitted included decorating objects such as lamp shades, picture frames, blinds, etc.; and home appliances such as baskets, trays, shelves, etc.

### 7.2 The Vetiver Handicraft Exhibitions:

**7.2.1 DIP '96 Exhibition:** After the Contest mentioned in section 7.1.1, 179 items submitted for the contest were displayed at the Exhibition Hall of the First International Conference on Vetiver (ICV-1) in Chiang Rai during 4-8 February 1996. A brochure describing the award-winning products was produced for wide distribution. The second exhibition of the same products (150 items) was organized during 28 - 31 August 1996 at Siam Grand Hall in Bangkok. In both exhibits, some products were also available for sale.

**7.2.2 Narayana Phand '97 Exhibition:** To celebrate the 60<sup>th</sup> anniversary of its founding, Narayana Phand Co. Ltd. organized an exhibit on vetiver handicrafts to commemorate His Majesty's Initiative on Vetiver during 1-31 August 1997. Products were available for sale.

**7.2.3 DIP '99 Exhibition:** After the Contest described in section 7.1.2, all 125 items submitted for contest were displayed at the Third National Seminar on Vetiver held at Kasetsart University in Bangkok, 15-18 January 1999. Later on, all 304 products submitted for DPI Contests in 1995 and 1999 (mentioned in sections 7.1.1 and 7.1.2) were re-displayed at the Queen Sirikit Botanic Garden, Mae Rim District, Chiang Mai for Her Majesty's viewing during the Royal visit on 2 February 1999. After the observation, Her Majesty graciously disseminated these products to the Bang Sai Handicraft Vocational Center, Ayutthaya Province, to serve as models of vetiver products and at the same time, to illustrate to the diplomats as well as the royal guests, the utilization of vetiver leaves in handicraft making.



## BLEACHING AND DYEING SOLUTIONS

Naturally, fiber derived from plants, whether the stems or leaves, have their original colors, which are yellow or brownish yellow. However, to meet the demand of the market, the fiber materials for weaving have to go through dyeing process by first bleaching to have a white color, and then dyeing to make colorful finished products. These processes are explained below:

Proportions	Methods
<ul style="list-style-type: none"> <li>• Dye water: 1 portion of fiber per 30 portions of water</li> <li>• Dye color: depends on the preference for dye color concentration</li> <li>• 2 - 4 tablespoons of acetic acid</li> </ul>	<ul style="list-style-type: none"> <li>• Soak the fiber for at least 6 hours before dyeing.</li> <li>• Boil dye water at high heat or boiling slowly.</li> <li>• Put the dye color and stir thoroughly.</li> <li>• Put the fiber into the boiling dye water and constantly turning it over for 5 minutes. Then remove the fiber out of the water.</li> <li>• Add acetic acid and stir.</li> <li>• Place the fiber back in and continue boiling the fiber for 5-10 minutes. Keep turning it over.</li> <li>• Take the fiber out and clean with water.</li> </ul>

### Bleaching Solutions

Chemical Substance - Ratio	Methods
<ul style="list-style-type: none"> <li>• Bleach the fiber with <math>H_2O_2</math> at room temperature.               <ul style="list-style-type: none"> <li>- <math>H_2O_2</math> : Water = 1:20 - 1:30.</li> <li>- Use <math>H_2O_2</math>: 20-50 cc/liter</li> </ul> </li> <li>• Bleaching the fiber with <math>H_2O_2</math> at high temperature (about 70-80°C)               <ul style="list-style-type: none"> <li>- <math>H_2O_2</math> : Water = 1:20 - 1:30.</li> <li>- Use <math>H_2O_2</math>: 10 - 15 cc/liter and no more than 20 cc/liter.</li> </ul> </li> <li>• Bleaching the fiber with chlorine.               <ul style="list-style-type: none"> <li>- <math>H_2O_2</math> : Water = 1:20 - 1:30</li> <li>- Use chlorine powder: 8 - 10 g per liter.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Soak the fiber in water for 10-12 hrs before bleaching.</li> <li>• Clean the fiber with water.</li> <li>• Boil the water at about 80°C Add <math>H_2O_2</math> and stir thoroughly.</li> <li>• Add the fiber and leave for 30-60 min.</li> <li>• Take the fiber out and clean thoroughly.</li> <li>• Dissolve chlorine into prepared water. Divide the water into four colors. Wait until the chlorine is sedimented, then use the clear water. Repeat the step until all of the water are dissolve with chlorine. Soak fiber in the chlorine water for 30 min. and clean it with water. Then put the fiber in water which contains acetic acid 5 - 10%.</li> </ul>



## Color Mixture for Dyeing

Dye color	Color composition	Resulting color
Purple	Pink + Dark Blue <i>Steps</i> - Use pink color as the main color. - Gently add dark blue color and stop when it turns to purple. If one wants bluish purple, then continue adding blue color and it will give the color of reddish purple or bluish purple	Reddish purple Bluish purple
Crimson	Golden yellow + Pink <i>Steps</i> - Use pink color as the main color. - Gently add golden yellow until the color turns to crimson	
Grey	Dark Blue + Purple + Black <i>Steps</i> - Use moderate quantity of dark blue color. - Add a little of the purple color. - And finally add a little of the black color.	Light grey
	Dark Blue + Black <i>Steps</i> - Maintain dark blue as the main color and add moderate amount. - Add a little amount of the black color to make it bluish grey.	Dark grey
	Dark Blue + Purple <i>Steps</i> - Maintain dark blue as the main color and add moderate amount. - Add a little amount of purple to make reddish grey color.	Reddish grey
Green	Golden Yellow + Blue <i>Steps</i> - Use golden yellow as main color. - Gently add dark blue until it changes to dark green.	Dark green
	Light Yellow + Blue <i>Steps</i> - Use light yellow as main color. - Add dark green to give a green leaf color.	Leafy green
	Orange + Blue <i>Steps</i> - Use orange as main color. - Gently add dark blue to make brownish green.	Khaki color
Orange	Light yellow + Pinkish Red Golden yellow + Crimson <i>Steps</i> - Use yellow as main color and pour in first. - Then add crimson or pinkish red to make orange color	Orange
Brown	Yellow + Purple + Dark Blue <i>Steps</i> - Use yellow as main color. - Add purple to make it brown. - Add dark blue to make it dark brown.	Dark brown
	Golden Yellow + Bright Red + Dark Green <i>Steps</i> - Use yellow as main color. - Add bright red to make orange color. - Add little green to make brown color.	Golden brown
	Orange + Dark Blue <i>Steps</i> - Use orange as main color. - Gently add dark blue to make brown color.	Brown



## The Office of the Royal Development Projects Board

His Majesty King Bhumibol Adulyadej of Thailand has been dedicated to development work ever since the beginning of his reign in 1946. His Majesty has become familiar with the problems and real conditions of the people through constant visits to every region of the country, often accompanied by Her Majesty Queen Sirikit and other members of the Royal Family. It is during these many Royal visits to the rural areas that His Majesty has realized the need to initiate development projects that would directly benefit the people at the grassroots. Thus, the first Royal Development Project was launched in 1952 followed by numerous projects which currently reach the total of 2,700.

However, the implementation of the Royal Development Projects in the past lacked cohesiveness because each agency carried out the work on its own without coordinating with other concerned agencies. Therefore, in order to serve and implement the Royal initiatives through a consistently integrated system which allows the Royal Development Projects to run efficiently, the Thai government issued a "Regulation of the Office of the Prime Minister" which became effective on 9 September 1981. The Regulation led to the establishment of the Coordinating Committee for Royal Development Projects which later became the Royal Development Projects Board in 1993. The Board has the major task of directing, monitoring and coordinating the operation of government agencies and state enterprises concerning the Royal Development Projects. Moreover, it considers and approves projects, plans and activities as well as expenditures to be used in the operation of the projects. All of these tasks are supported by the Office of the Royal Development Projects Board (RDPB), the secretariat of the Board.

With agriculture being the backbone occupation in the Thai society, His Majesty the King understood the vital need in preserving natural resources, and therefore, initiated the Vetiver Grass Project in Thailand. The Project principally aims to mitigate soil erosion, a distinct aspect of environmental deterioration in Thailand which needs to be managed properly. His Majesty recognizes the potential of vetiver grass as a practical and inexpensive yet effective management and conservation tool to address the soil erosion problem. As a result, the Committee on the Development and Promotion of the Utilization of Vetiver (CODPUV) under His Majesty's Initiative has been set up under the administration of the RDPB in 1992 to look after all the Royally-initiated vetiver projects implemented in various parts of the country. This includes the Doi Tung Development Project in Chiang Rai which is recognized as the world's largest vetiver project. One of the tasks of the CODPUV was the organization of the First International Conference on Vetiver (ICV-1) on 4 to 8 February 1996 in Chiang Rai, Thailand. ICV-1 was co-organized by the Chaipattana Foundation and the Mae Fah Luang Foundation with the collaboration of the World Bank and the FAO. The main purpose was to commemorate the 50<sup>th</sup> Anniversary Celebrations of His Majesty the King's Accession to the Throne.

Immediately after ICV-1, a proposal was made by Mr. Richard G. Grimshaw, President, The Vetiver Network, to establish the Pacific Rim Vetiver Network (PRVN) in Thailand with the principal objective of serving as the center to collect and disseminate information on the use of vetiver grass in the form of newsletters, occasional publications as well as a homepage on the internet. His Majesty the King agreed with the proposal and commissioned the setting up of the PRVN under the supervision of the CODPUV, to be administered by the ORDPB. The PRVN then became active with the establishment of a working team on 6 May 1997.



