The Royal Messages Concerning Vetiver: A Miracle Grass

Office of the Royal Development Projects Board
Bangkok, Thailand
January 2000

Their Majesties the King and the Queen paying a royal visit to the Vetiver Multiplication and Extension Project under His Majesty's Initiative at the Mae La Noi Royal Project Development Center, Ban Dong Village, Huai Hom Sub-district, Mae La Noi District, Mae Hong Son Province (14 March 1992).

Front cover photo caption:

His Majesty the King plants vetiver grass as a hedgerow at the Huai Sai Royal Development Study Center, Cha-am District, Phetchaburi Province (3 April 1997).

Compilation of

The Royal Messages of His Majesty King Bhumibol Adulyadej of Thailand

Concerning

Vetiver: A Miracle Grass

Delivered during

June 1991 – July 1998

Office of the Royal Development Projects Board

Bangkok, Thailand

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A compilation of the royal messages related to the vetiver grass delivered by His Majesty King Bhumibol Adulyadej of Thailand during June 1991 to July 1998.

About this publication:

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Preface

Degradation of soil resources results mainly from the topsoil being eroded by the impact of rain and the subsequent surface runoff. Sometimes landslides occur, which heavily damage agricultural lands making them less productive and producing lesser yields than before, even though receiving sufficient rainfall. Surface runoff in large volumes makes it impossible for the soil to retain water to its full capacity.

His Majesty the King, recognizing the problem and its causes, investigated the potential of vetiver grass, an indigenous Thai plant with the specific properties of helping to prevent soil erosion and conserve soil moisture. His Majesty advocated the idea that studies and experiments should be conducted on vetiver grass, initially to Dr. Sumet Tantivejkul, Secretary-General of the Royal Development Projects Board (RDPB) on 22 June 1991, and later on to concerned parties on various occasions, particularly when he visited the sites of the Royal Development Study Centers and Projects under His Majesty's Initiative.

In Celebration of the auspicious occasion of His Majesty the King's Sixth Cycle Birthday Anniversary, the Office of the Royal Development Projects Board, in collaboration with the Chaipattana Foundation, is organizing the Second International Conference on Vetiver, to be held at the Dusit Resort and Polo Club, Cha-am, Phetchaburi Province, on 18-22 January 2000. It is, therefore, considered a good opportunity to compile all the Royal Speeches delivered on various occasions since 1991 up to the present, for distributing to the participants to appreciate the ingenious contribution of His Majesty the King and also as a guideline for their future works. In addition, a summary of the evolution of vetiver development in Thailand has also been put together. The advances and successful outcomes were due to the positive cooperation between various agencies which worked according to the Royal Initiative of our beloved King.

On behalf of the Royal Development Projects Board, we wish to acknowledge sincerely the voluntary contribution of Dr. Narong Chomchalow, who had earlier prepared the Royal Messages in two booklets entitled:"Glory to the Land (1992)" and "Glory to the Land-2 (1997)", published by the FAO Regional Office for Asia and the Pacific; and for his help in compiling and editing the manuscript of this booklet. We are also grateful to Dr. Suyanee Vessabutr of the Queen Sirikit Botanic Garden for her help in editing the manuscript.

Contents

Introduction

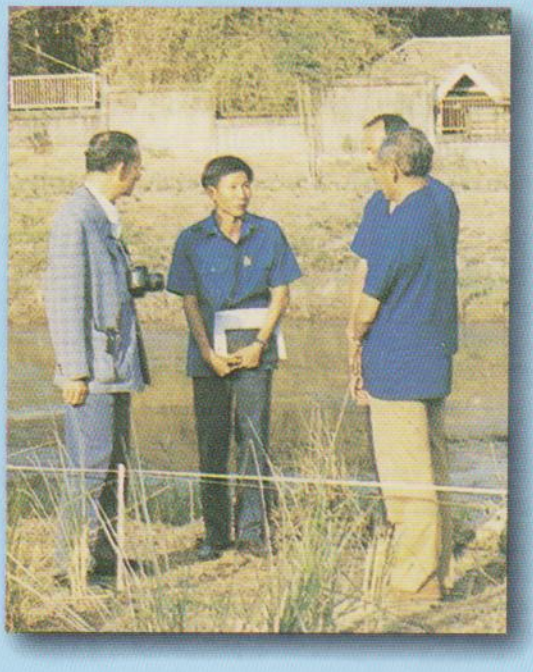
No one can deny that soil conservation is essential for sustainable food production. Without proper care and maintenance, those blessed with rich fertile soil will soon find out that the resource is land for cultivation". However, throughout the recent past, the country has experienced severe land degradation because of an inevitable impact from its economic growth. Three factors which have caused the soil to deteriorate are deforestation, improper usage of soil resource, and lack of interest in the conservation and sustainable development. These factors have aggravated soil erosion problem which became more critical for farmers with each passing day.

Deforestation can still be seen throughout the country mainly around the watershed areas of every region. This sometimes led to drought and so after a heavy rain, the soil was severely eroded, thus washing away topsoil.

It is alarming to note that 127 million Rai (20.32 million hectares), or almost 40% of Thailand's total land area of 321 million Rai (51.36 million hectares), is facing soil erosion problem. As previously mentioned, since the forests had been cleared, so the land is left open, unprotected, and would then be scoured after each heavy rain. This has caused water catchment facilities to become shallow and capable of detaining less water. Finally, the land is flooded during rainy season, and that for cultivation is no longer productive. The crop yield has decreased and farmers have to live in hardship. This deteriorating situation has directly affected agricultural productivity, ecological systems, and environmental conditions. The soil lacks property to hold water, and the organic matters as well as other nutrients are washed away with the water. Consequently, crops cannot grow properly and unable to produce regular yields as they are grown under poor soil condition.

But hopes had returned to the poor farmers facing the soil erosion problem when His Majesty, King Bhumibol Adulyadej of Thailand, who has ruled the country for more than 50 years, recognized the hardship of his people and graciously initiated the idea to solve the troubles of poor soil quality and destruction of water and soil resources.

Their Majesties the King and the Queen, and Her Royal Highness Princess Maha Chakri Sirindhorn discuss the vetiver experiment with His Serene Highness Prince Bhisatej Rajani, Director of the Royal Project at its Headquarters, Chiang Mai (20 February 1992).



His Majesty and H.R.H. Princess Maha Chakri Sirindhorn discuss vetiver trials with staff of the Huai Hong Khrai Royal Development Center, Chiang Mai (24 February 1992).

His Majesty plants vetiver tillers as a single strip along the contour line of the slope.

His Majesty's approach on development focused on the conservation of natural resources in order to provide optimal sustainable benefit to human beings. His Majesty first emphasized on the problem of topsoil loss in the northern part of Thailand. For a long time now, His Majesty has directed projects to conserve topsoil using different methods, for instance, planting large trees on high steep slopes and in some areas, planting ground covered crops. However, topsoil loss still remains a problem, coupled with deforestation and environmental destruction. When His Majesty learned that vetiver grass has deep penetrating root system, spreading out to form an underground wall barrier which helps to filter silt and keep topsoil very well, he then initiated the idea of using vetiver grass for the conservation of soil and water, aside from using other methods. Since growing vetiver grass requires simple technology, the farmers can grow it themselves. Moreover, vetiver grass does not need much care and the cost for growing it is very low.

His Majesty has first conveyed the idea of using vetiver grass to Dr. Sumet Tantivejkul, Secretary-General of the Chaipattana Foundation and of the Royal Development Projects Board on 22 June 1991. During this historical moment, for vetiver research and development, His Majesty recommended that a study and experimentation in growing vetiver grass to protect soil erosion be carried out at the Royal Development Study Centers and other areas across the country. Later, His Majesty has added more ideas into the program and also followed up on the progress of the projects until now.

The Royal Messages Related to Vetiver Grass

Paragraphs below are a compilation of the royal messages delivered by His Majesty King Bhumibol Adulyadej of Thailand concerning the use of vetiver for soil and water conservation, from the very first message on 22 June 1991 up to the latest one on 14 July 1998.

22 and 29 June 1991:

His Majesty summoned Dr. Sumet Tantivejkul, Secretary-General of the Royal Development Projects Board at Chitralada Villa, Dusit Palace in Bangkok, with the following royal commands:

1. Start investigation on planting vetiver to prevent soil erosion at the Huai Sai and Khao Hin Son Royal Development Study Centers.

2. In such investigation, topography should be taken into consideration. Two categories of topography are to be encountered:

- *Sloping area: Vetiver planting should be made along the contours which are made across the slopes and in the gullies on the hills in order to prevent soil erosion and to conserve soil moisture.*
- *Flat land: Vetiver should be planted:*
  - *along boundaries of the plots*
  - *within the plots (1 or 2 rows / plot)*
  - *in between rows of field crops.*

3. As for results of the investigation, the following data should be recorded: growth of plant and root system, ability to conserve soil fertility and moisture, and the performance of various ecotypes of vetiver.

5 July 1991:

His Majesty the King summoned Mr. Pramote Maiklad, Director of the Special Affairs Office, Royal Irrigation Department, and Police Colonel Theeradej Rodphothong, Director of the Huai Sai Royal Development Study Center, at Klai Kangwon Palace in Hua Hin, Prachuap Khiri Khan to give the royal advice as summarized below:

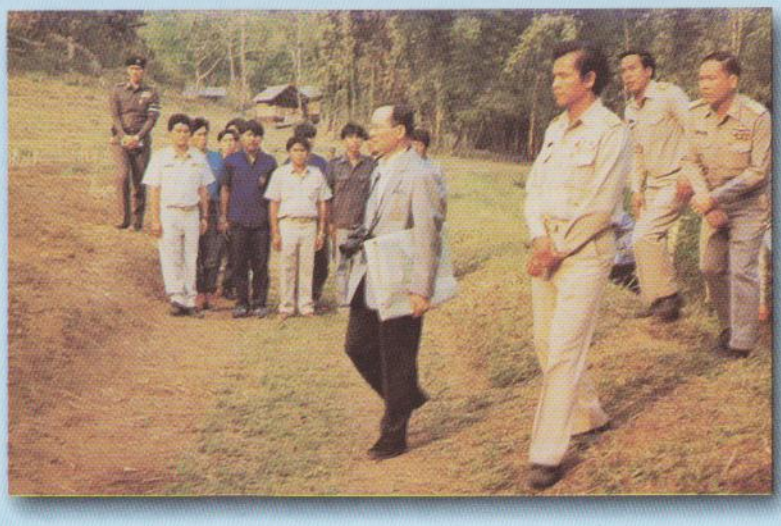
Natural Method for Surface Soil Conservation:

1. His Majesty has long learned about natural methods for surface soil conservation. In many localities, crop cultivation often takes place on exposed surface soil like raising the bed, then working to loosen the soil. This is not a natural way and it may cause problems in the future. The royal advice to the Huai Sai Center was to do farming without damaging the natural condition, that is to do farming with no tillage and that every project under the center's supervision must observe that as a model, before finding the suitable way to introduce its method to the farmers to follow.

2. His Majesty has studied the World Bank documents on the use of vetiver for surface soil conservation and hence instructed the Huai Sai Royal Development Center to do experiment on vetiver planting to conserve surface soil, buy planting and multiplying vetiver in different types of habitats such as around the edge of the gullies, in the cashew-nut plots, on sloping land, or along the natural waterways by putting

Their Majesties the King and the Queen plant vetiver for multiplication at Mae La Noi Royal Project Development Center, Mae Hong Son, 14 March 1992.

His Majesty plants vetiver at Pang Tong Highland Agricultural Development Center, Mae Hong Son, 19 March 1992.



stones to form small weirs and planting vetiver on the lower front; or on farm land by mixing it with maize cultivation. The royal instruction also included taking photographs of the situations before and after the vetiver trials to provide the evidence. All projects under the Huai Sai Center must do everything accordingly to provide a case for demonstration.

7 July 1991:

Their Majesties the King and the Queen paid a royal visit to Suan Hat Sai Yai Project under His Majesty's Initiative at Pran Buri District, Prachuap Khiri Khan Province. His Majesty suggested the Project to grow vetiver as it is valuable for soil erosion prevention. It is particularly beneficial on steep slopes where it can conserve surface soil as well as accumulate organic matter in the soil. In addition, its young leaves can be fed to livestock.

Blessed with His Majesty's initiative, the Project started to collect native ecotypes of vetiver growing in natural habitats in the nearby areas. A few ecotypes were received from other places. They were multiplied and tested at various sites in the Project area since October 1991.

19 February 1992:

During a dinner reception at Bhubhing Palace in Chiang Mai, His Majesty requested the Commissioner of the Border Patrol Police General Headquarters to plant vetiver at various operational sites under the supervision of the Border Patrol Police, and also in the nearby villages, and then try to spread the cultivation throughout the country since vetiver has characteristics suitable for the soil conservation system. This could be done by planting it as a hedge row along the contour. Successful results have already been obtained from the experiments conducted in several other countries in Asia. It was also found that the yield of the crops grown between hedgerows of vetiver had been dramatically increased.

20 February 1992:

Their Majesties the King and the Queen, together with Her Royal Highness Princess Maha Chakri Sirindhorn, paid a visit to the Royal Project Headquarters in Chiang Mai. The royal family observed the

collection plot of vetiver ecotypes collected from various locations in Thailand as well as several imported ecotypes, and experiments such as planting vetiver across the gullies to form a natural check dam.

Later in the day, the royal family visited the Sixth Land Development Regional Office in Chiang Mai. His Majesty made the following comments:

1. Vetiver is a plant with a deep root system that penetrates vertically into the soil as a semi-solid wall-like structure. This formation helps trap debris and prevents erosion of surface soil. It should be investigated further to verify the preliminary findings.

2. Vetiver should be planted as a single row with plant spacing of 10-15 cm. Such a spacing not only requires less area, but also is easy to take care of. In particular, it should be planted in gullies as well as on steep slopes in order to prevent soil erosion.

3. As vetiver planting is a new practice, His Majesty urged that the growers should not expect too much of it in terms of returns. However, the indirect benefits would be enormous. Moreover, there is no need to plant vetiver in farmers' cropping areas. The first attempt should be made in the experimental stations of the Land Development Department for demonstration, as well as to select for the best ecotypes, the characteristics of which include non-flower formation and drought resistance. In this way, the farmers in the vicinity will see and follow.

24 February 1992:

Their Majesties the King and the Queen and H.R.H. Princess Maha Chakri Sirindhorn paid a visit to Huai Hong Khrai Royal Development Study Center, Doi Saket District, Chiang Mai. After planting vetiver in experimental plots, His Majesty gave the following comments:

1. Vetiver planting should be extended as it helps in the conservation of both soil and water. Its extensive fibrous root system will absorb large amounts of water which helps in moistening the surrounding soil, thus making it cultivable to other economic crops, both annuals and perennials. Another good quality of vetiver is its ability to trap organic matter, as well as other toxic materials and chemicals, thus preventing them from flowing along with the water into

After planting vetiver hedgerow (above), His Majesty explains the technique of vetiver growing to the staff of Khao Cha-ngum Land Reclamation Study Project, Ratchaburi (8 June 1992)

Their Majesties the King and the Queen plant vetiver at Suan Hat Sai Thong Project, Prachuap Khiri Khan (6 July 1992).

His Majesty gives advice on vetiver trial to staff of the Huai Sai Royal Development Study Center, Phetchaburi (22 July 1992).

streams and rivers. They would then be accumulated and slowly disintegrate in the soil.

2. Conduct trials on different ecotypes and concurrently select those which are adaptive to the locations in order that they may be used in extension programs after multiplication, particularly on mountain slopes with severe soil erosion, such as at Khao Cha-ngum Land Reclamation Study Project, as well as Wat Yanasangkha-wararam. As for the time of planting, His Majesty advised that vetiver should be planted three months prior to the onset of the rainy season in order to allow the vetiver plants to be vigorous enough to withstand the damage in the rainy season. His Majesty also suggested conducting an experiment in growing vetiver along gullies as a check dam, as well as on steep slopes with barren soil along highways in order to prevent soil erosion.

14 March 1992:

Their Majesties the King and the Queen, together with H.R.H. Princess Maha Chakri Sirindhorn paid a visit to Mae La Noi Royal Project Development Center, Mae La Noi District, Mae Hong Son Province. His Majesty summoned the Hmong villagers who are growing cabbages as a summer cash crop to interplant with vetiver along the cabbage rows in the dry season, benefiting from sprinkler irrigation given to the cabbage plants. Slips of locally collected ecotypes of vetiver were also planted by the royal family for demonstration and multiplication.

19 March 1992:

Their Majesties paid a visit to the Pang Tong Highland Agricultural Development Center, Muang District, Mae Hong Son Province. His Majesty remarked that in growing vetiver for the purpose of soil and water conservation, planting should take place three months before the onset of the rainy season and preferably in the area where water is available to be given to the young vetiver slips in order to induce their growth to withstand the impact of falling rain.

14 May 1992 :

His Majesty summoned His Excellency, Minister of Agriculture and Cooperatives at the Royal Chitralada Palace with the following advice:

1. Cultivation of vetiver must be extended and accelerated on nation-wide scale within two years. Although the implementation may cost some budget, it is worth getting started.

2. The vetiver ecotypes selected for extension should be those unable to propagate by seed.

3. In planting vetiver, dividing the clumps to obtain planting material should be done when roots are about 15 cm in length. Transplanting can be done without cutting the bottom of the poly-bag because the vetiver roots can penetrate out of the bag.

4. Vetiver should be planted in the cropping areas, around farm ponds and in forest areas. It could also be planted in the gullies to trap sediments and hence prevent them from flowing into the reservoirs. Its dense fibrous root system would also help holding soil moisture.

5. At the Huai Sai Royal Development Study Center, vetiver is to be planted in hedges in Muslim village areas to build up top soil. At the Khao Cha-ngum Land Reclamation Study Project, vetiver is to be planted in single rows on the upper area adjacent to Khao Khieo. Here, topsoil had to be added to the area from the beginning. However, when vetiver grows adequately, it would help build up the topsoil.

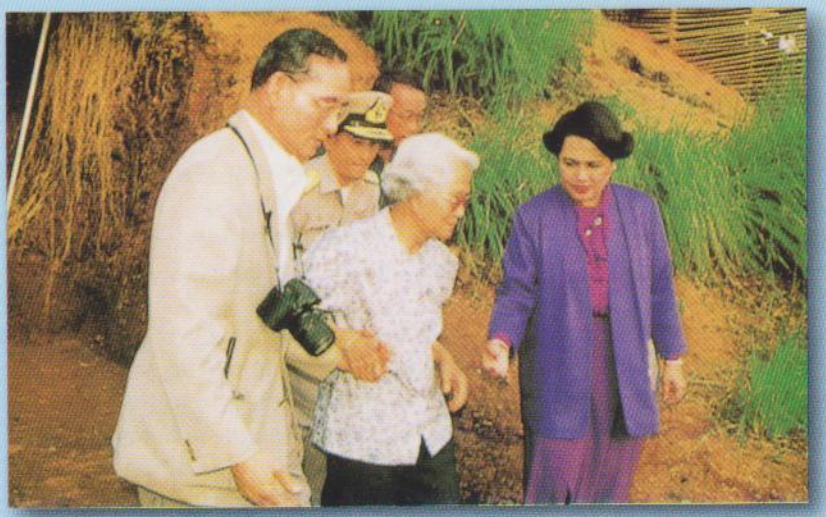
8 June 1992 :

His Majesty paid a visit to the Khao Cha-ngum Land Reclamation Study Project, Photharam District, Ratchaburi Province, on which occasion the following royal remarks were made:

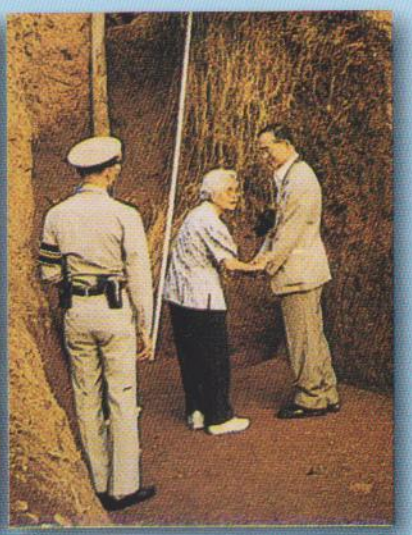
1. In selecting vetiver ecotypes for multiplication, extreme caution must be taken in selecting those which do not produces seeds, as they should not spread easily and become noxious weeds.

2. In the watershed area of the reservoir, vetiver should be planted on the contour lines along the reservoir edges. These contour lines should be made: (i) at the water level, (ii) 20 cm above water level, and (iii) 20 cm below water level (as water rarely reaches the specified level). In so doing, the following benefits are expected:

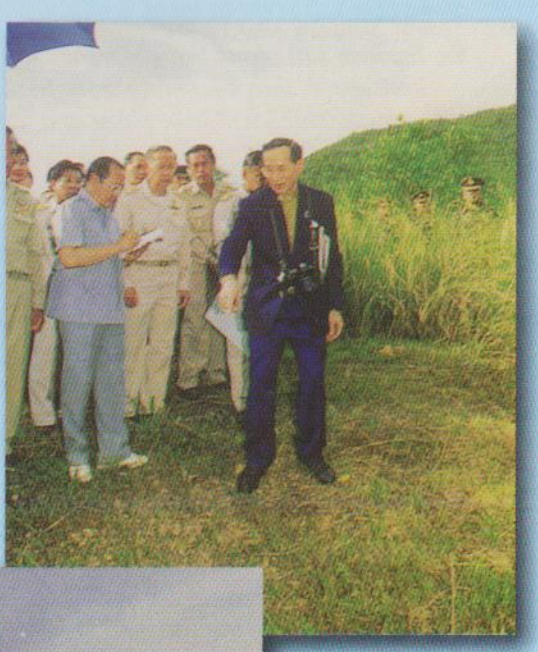
Soil erosion into the reservoir, causing sedimentation, will be prevented. If soil is needed for other purposes, digging can be done by

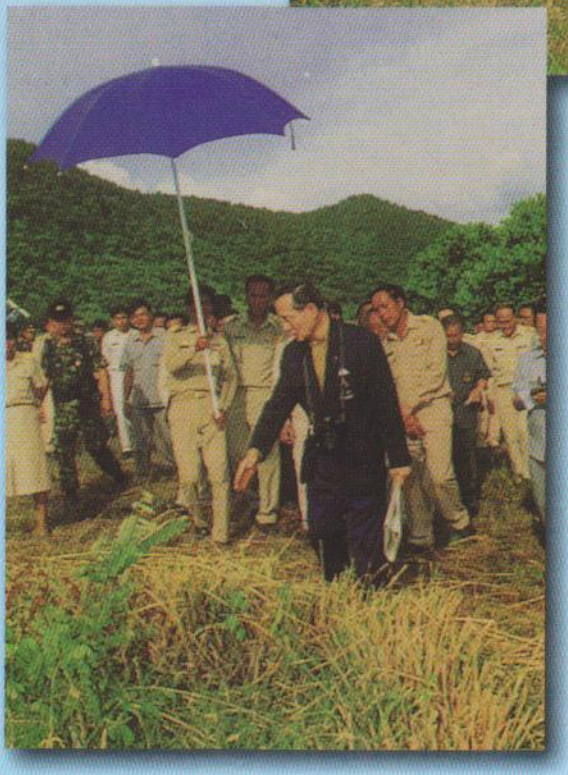


H.R.H. the Late Princess Mother takes Their Majesties the King and the Queen to observe a vetiver plot at the Doi Tung Development Project, Chiang Rai (above), and shows His Majesty an uprooted vetiver plant (bottom left), and a 9-month old vetiver with 3.7 m root (bottom right) (23 February 1993)



His Majesty instructs staff of Khao Changum Land Reclamation Study Project, Ratchaburi, to plant vetiver throughout the entire Project area to help conserve soil moisture and nutrients (15 July 1996)





and emphasizes that vetiver tillers should be planted very close to each other, at 5 cm apart.

using machinery which could run over vetiver plants, causing no damage whatsoever to them.

- *Surface soil along the watershed area of the reservoir will be conserved, thus becoming more fertile and beneficial to forest growth which will take place at a faster rate.*

3. Experiments to grow vetiver in lateritic soil should be made to see how deep its root system can reach. Initially, hard-pan layer should be broken before planting vetiver by making a hole through it. After two or three years of growth, observation should be made on how well the root system develops through the hard-pan layer.

4. To prevent gully erosion, two planting methods are suggested, viz.:

- *In the shape of an inverted V in the gully (sharp point on higher level): Vetiver planting should be extended along the length of the level line in a fish-bone pattern, with vertical interval of one meter in order to stop gully erosion and to force water to penetrate vertically downward into the soil at the front line of the vetiver.*
- *As straight line across the gully: Through this method debris would accumulate on the gully bed which ultimately would be filled up.*

5. Vetiver should be planted in areas with 'Ya Kha' or cogon grass (Imperata cylindrica), in order to see how well it can control this noxious weed. The best method is to plant vetiver encircling 'Ya Kha'. After vetiver is well established, set fire to 'Ya Kha' in order to see if vetiver can prevent the spread of fire to other areas as well as to keep 'Ya Kha' under control.

6. Vetiver should be planted around a fruit tree. This would prevent the area around the tree from sinking. At the same time the cut leaves used as mulch would ensure moisture conservation for the fruit tree.

7. As for cropping areas, three methods can be practiced:

- *Along the boundaries of the cropping area.*
- *Interplant in the cropping area with 1 or 2 rows of vetiver*

- *In the grove between two raised rows of the field crops.*

8. On mountainous areas, vetiver should be planted along the contour and in the gullies in order to conserve soil moisture.

6 July 1992:

Their Majesties the King and the Queen revisited the Suan Hat Sai Yai Project under His Majesty's Initiative. The royal couple examined the performance of vetiver in the multiplication plot and on the slope. His Majesty suggested that closer spacing should be attempted, especially as the ecotypes and their characteristic were not yet determined. Their Majesties then planted a locally-collected ecotype from Khao Tao in the experimental plots. Five days after the visit, His Majesty sent an expert to examine the ecotypes planted at the Project. It was verified that the local ecotypes planted were excellent. Consequently, His Majesty directed that multiplication of these ecotypes be made in order to be used in other projects.

22 July 1992:

His Majesty visited the Huai Sai Royal Development Study Center, Cha-am District, Phetchaburi Province. After planting vetiver in the experimental plot at the reservoir area, His Majesty gave the following advice:

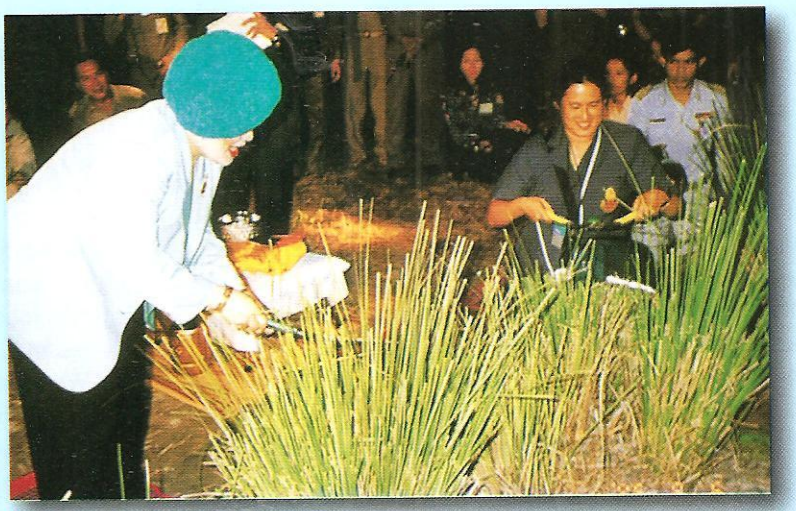
1. Planting of vetiver for soil conservation should be encouraged as it has so many virtues, especially for soils of similar structure as that of Huai Sai. It can act as a living natural check dam to help improve physical and chemical properties of the soil.

2. In planting vetiver along the contour, the spacing between rows should be extended to 1-2 m vertical intervals in order to save planting material, but the spacing between plants should be closer to hasten the effective period of vetiver. A semi-circle hedge of vetiver should be established around the fruit trees.

3. Vetiver should be planted on the watershed area of the reservoir in order to trap organic debris and chemical and toxic materials carried along by the water into the reservoir. This will prevent them from entering and polluting the water. Once absorbed into the vetiver plant, they will slowly disintegrated, and thus become non-toxic to the environment, and even be released as nutrients.

Still at Khao Cha-ngum Land Reclamation Study Project. His Majesty plants a tree upon which a semi-circular hedgerow of vetiver is established at the lower side to help conserving soil moisture for the tree (above), and admires the luxuriant growth of the vetiver hedgerows planted along the contour of the slope (bottom)

Their Majesties the King and the Queen, and H.R.H. Princes Maha Chakri Sirindhorn pay a royal visit to the Huai Sai Development Study Center, Phetchaburi (6 August 1996).



28 August 1993:

His Majesty summoned Dr. Sumet Tantiwejkul, Secretary-General of the Royal Development Projects Board at Chitralada Palace in Bangkok, with the following royal commands:

In planting vetiver, if the seedlings are grown in large clumps, they should be planted 15 cm apart. However, if spacing between plants is reduced to 2-3 cm, using single tillers, they may fill the space along the narrow hedgerows faster. The number of tillers employed can also be reduced; they will grow towards each other within a few months and can effectively control soil erosion caused by runoff. This is in contrast to a longer time, say two years, if large clumps are used with wider spacing. They consequently cannot perform their function fast enough. This is evident at Doi Tung where large clumps were planted, thus requiring larger amounts of planting material. This, however, was an experiment designed to establish effective erosion control, hence a quick performance was expected.

One could split planting material into smaller clumps (i.e. few tillers) but plant them close together. As for spacing between rows, it should be about 2 m along vertical intervals, along the contour hedgerows by viewing 2 m down to mark the hedgerows down below. For convenience, however, vertical intervals may be reduced to 1.5 m (as this is a normal eye-level height of most people) so that they do not have to stretch their arms while standing on their toes. Using this simple device, one can make contour effective hedgerows marking strips parallel to the uppermost one, with the same vertical interval of 1.5 m beginning with the uppermost strip.

15 July 1996:

His Majesty together with Her Royal Highness Princess Maha Chakri Sirindhorn paid a visit to the Khao Cha-ngum Land Reclamation Study Project, Photharam District, Ratchaburi Province, on which occasion the following additional royal remarks were made to Dr. Sumet Tantiwejkul, Mr. Chari Tulyanond, Mr. Sawat Wattana-yakorn, Mr. Rungruang Chulachart, Mr. Pramote Maiklad, Mr. Sitthilarp Wasuwat, Mr. Sima Morakul, Mr. Payung Nopasuwan, and other officials who came to greet His Majesty. The issue of planting distance for vetiver was emphasized by His Majesty.

1. Tillers should be planted very close to each other, leaving a distance of only 5 cm between plants.

2. The planting of vetiver to conserve soil moisture for fruit trees and other perennial crops using circular strips around the trees may create some problem as the root system of vetiver may be quite extensive and thus competing with the trees for some nutrients. A semi-circular hedgerow may be made at the lower side of the trees in order to solve this problem. In this way, vetiver will perform its function in effectively conserving soil moisture for the trees afterwards.

3. In planting vetiver in the shape of an inverted V in order to prevent the formation of gully erosion, vetiver should be planted along contour lines across the gully, having the upper hedgerow (at the tip of the V-shaped configuration) resting on higher ground level than the lower hedgerow. When runoff water flows along the slope of the area reaching the vetiver hedgerow, the latter will reduce erosion caused by running water in the gully. This system will quite effectively help debris and sediment to accumulate in the gully.

4. Planting vetiver in a hole made by drilling deep down to the level of lateritic soil should be experimented. Fill the hole with good soil and plant vetiver in it. The vetiver roots will rapidly penetrate deep down to the level of lateritic soil.

5. Vetiver planting throughout the entire area of the Khao Changum Project should be implemented.

6 August 1996:

Their Majesties the King and the Queen, together with Her Royal Highness Princess Maha Chakri Sirindhorn, paid a visit to the Huai Sai Royal Development Study Center, Cha-am District, Phetchaburi Province. His Majesty admonished Dr. Sumet Tantiwejkul, Mr. Pravit Tabtim-on, Mr. Chaichan Chalothorn, and other officials as follows:

1. In planting vetiver, if its hedgerows were placed so close to the strips of field crops, or quite close around fruit trees, they may cause a water deficit to the crops or fruit trees as vetiver consumes quite large amounts of water. This would make it difficult for water to reach the root systems of the crops since vetiver roots form a living

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His Majesty advises the staff of Huai Sai Development Study Center during his visit to start experiment on planting vetiver on hard-pan soil by drilling a hole and fill the hole with good soil and plant vetiver in it to see if the roots penetrate deep down further (above) and takes a photograph of his most favorite object (6 August 1996).

Their Majesties the King and the Queen plant vetiver as a hedgerow at the Huai Sai Development Study Center, Phetchaburi (3 April 1997).

wall beneath the soil. Therefore, planting vetiver in a semi-circle around fruit trees with close spacing of tillers is correct.

2. In the reforestation area on the foothills of Khao Thong, do not use the "peeling" method, as nutrient, together with soil and water, is moving downward from the mountain. Meanwhile, vetiver hedgerows should be extended further, in the shape of an inverted V. Sooner or later, the gully will be filled with sediments. In a deep gully, a ridge of soil or rock should be first made across the gully to form a check dam. Do not plant vetiver in the gully directly. In addition, the space between vetiver contour hedgerows will have better soil quality. Suggestions should be made to farmers to grow cash crops in this space.

3. In planting vetiver by using a drill into the soil, the drill should be hand operated, and drill only a certain spot as in the area of Khao Cha-ngum. The idea is to make a hole in the hard-pan soil so that vetiver roots can penetrate into it.

4. The procedure in planting vetiver to fill empty spots along hedgerows on hard-pan soil is to use a drill along the empty spots and fill the hole with compost.

5. To cut vetiver clumps one might use large scissors up to the height of about 30 cm. The soil along hedgerows of vetiver will be fertile, full of plant nutrients, thus suitable to be planted with annual crops or fruit trees.

His Majesty then demonstrated how to grow vetiver to fill empty spots along the hedges. This was done by digging a ditch along the empty spots and filled it with a mixture of soil and compost. Vetiver slips were then planted close together, with a distance not exceeding 5 cm along the empty spot, then cut the leaves off, leaving 30 cm stock so that the new plants along the side receive full sunlight. Watering should be made regularly until the vetiver plants are well established. The soil deposited along the upper hedgerow is quite good, with a depth of 30 cm. Do accelerate vetiver planting on the empty spots in order to make the hedgerows effective for soil fertility improvement.

3 April 1997:

His Majesty paid a visit to the Huai Sai Development Study Center, Phetchaburi Province. He first visited a trial near the reservoir

where vetiver was planted on the soil having hard-pan layer underneath. Then His majesty made the following remarks:

Try to find a method to make a hole through the hard pan, then fill the hole with good loamy soil to accommodate the vetiver growth so that its roots can penetrate through the hard pan. Vetiver planted in this way will bring moisture to break the soil and make it friable.

1. Pursue the experiment on growing vetiver as a hedgerow along the contour, with spacing of 5 cm between plants in order to prevent erosion of topsoil and build up a topsoil layer from the accumulation of debris in front of the hedgerow. Afterwards, the trapped soil can be used to grow crops.

2. In planting vetiver around perennial trees, the semi-circle system should be used in order to trap moisture for the trees.

At the second location where work on soil and water conservation around the flood plain of Bo Khing Mountain was under way, His Majesty made the following remarks:

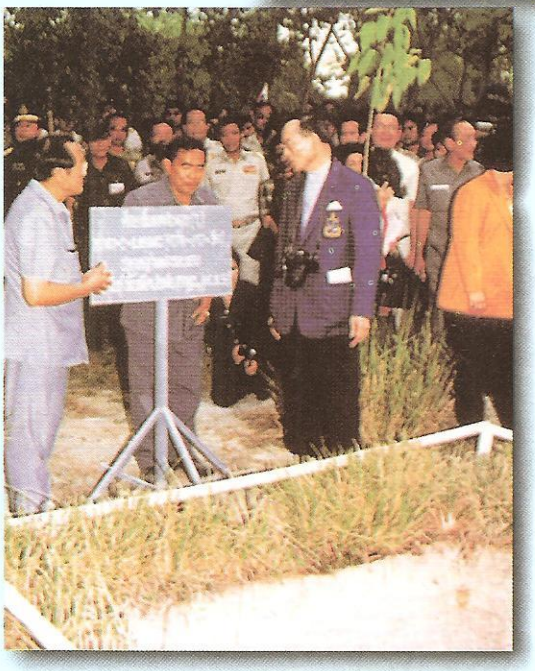
- *Replant the area with forest trees and plant vetiver along the contour in hedgerows. Such an approach will have an effect when it rains as leaf litter carried along the runoff water will be collected in the front of the vetiver hedgerows, thus improve soil fertility. The Royal Forest Department has the duty to reforest while the Department of Land Development has the responsibility of planting vetiver. The Huai Sai Development Study Center will be the coordinating unit for both departments.*

23 April 1997:

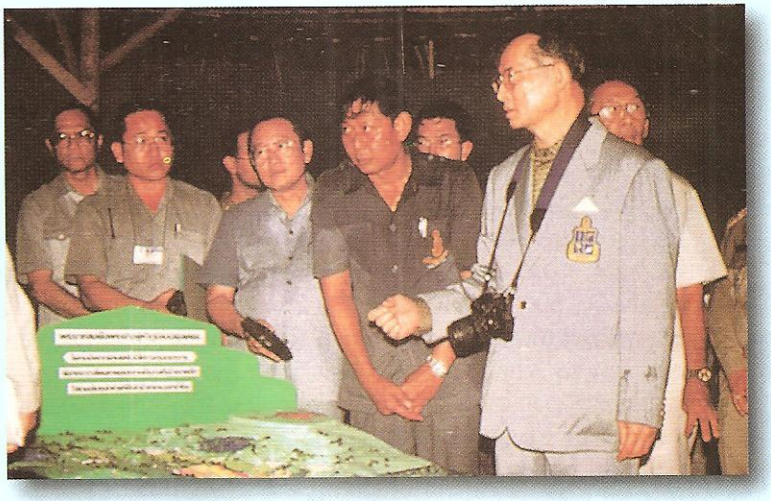
During his royal visit to the Khao Hin Son Royal Development Study Center, Chachoengsao Province, His Majesty made the first visit on the rim of Huai Chek Reservoir. The following royal remarks were recorded:

1. Conduct the experiment by planting vetiver around the forest area in order to prevent soil erosion of the top soil. Leaf litter of the forest trees will improve soil fertility when they are decomposed. Vetiver planted between rows of forest trees will not die, but temporarily halt

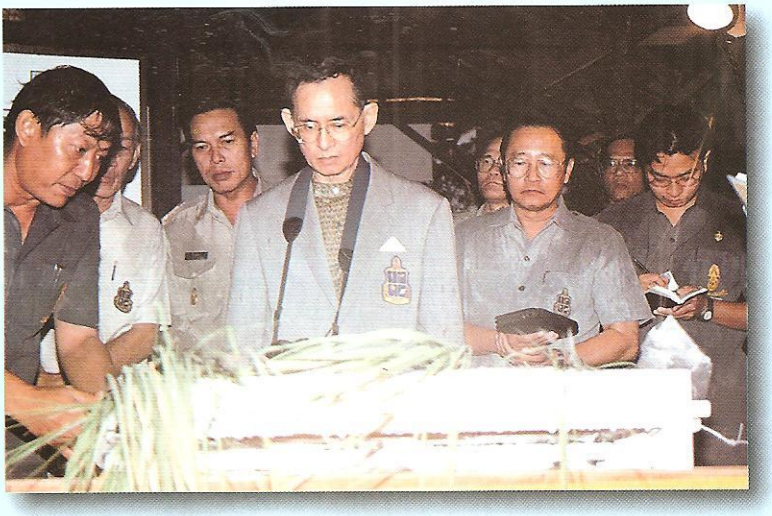
At the Huai Sai Development Study Center, Their Majesties the King and the Queen examined a block of hard-pan soil (3 April 1996).



His Majesty gives advice on growing vetiver on hard-pan soil by making a hole through it then fill the hole with good loamy soil to accommodate the vetiver growth to see if its roots are able to break the hard-pan soil.



During a royal visit to the Khao Hin Son Royal Development Study Center, Chachoengsao, His Majesty gives advice on planting vetiver, e.g. around forest areas, on hard-pan soil, etc. (23 April 1997).



its growth. When the forest trees are cut down, vetiver will resume its growth.

2. Another experiment should be made to grow vetiver on hard-pan soil by drilling a hole through the hard-pan layer before planting, then plant vetiver in the hole. Its roots will penetrate downwards and break the hard-pan layer. Afterwards, new soil will be formed with good fertility through the accumulation of sediments and leaf litter gathered in front of the vetiver hedgerow.

In the royal working pavilion at 'Utthayan Matcha' (fish garden) at the second site, His Majesty advised the Director of the Khao Hin Son Development Study Center to conduct a study on growing vetiver on hard-pan soil in Khao Hin Son District. Instructions for similar studies of the hard-pan soils at Khao Cha-ngum (the Khao Cha-ngum Land Reclamation Study Project), and at Huai Sai (the Huai Sai Development Study Center) were also given.

9 May 1997:

On the auspicious occasion of the 'Phutchamongkhon Day' (Crop-Praising Festival), His Majesty, together with Her Royal Highness Princess Maha Chakri Sirindhorn, paid a visit to the field demonstration plot in Chitralada Palace, and summoned His Excellency, Minister of Agriculture and Cooperatives, Mr. Chucheep Harnsawat, and his Deputies, as well as other high-ranking officials of the Ministry on the issue of soil conservation with the following messages:

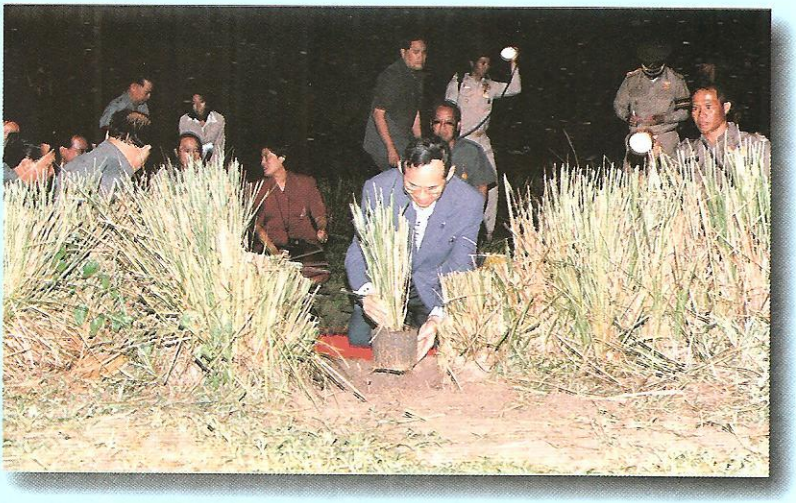
- *Soil conservation should go along with forest conservation and rehabilitation. In addition to solving the problem of acid soil, as His Majesty had already prescribed, soil conservation measure by the use of vetiver should be extensively implemented in order to prevent topsoil from being eroded. His Majesty himself conducted the experiments at the Huai Sai Development Study Center and at the Khao Cha-ngum Land Reclamation Study Project. He demonstrated at several Development Study Centers and requested the Ministry to consider the same implementation in all degraded areas requiring rehabilitation and soil and water conservation.*

24-25 July 1997:

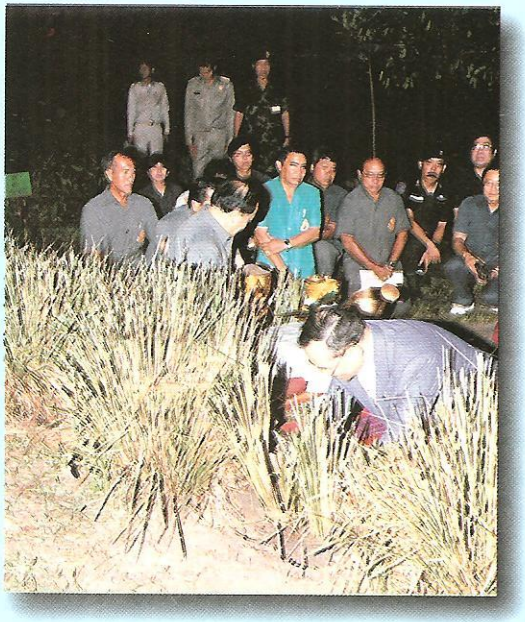
His Majesty the King, who traditionally confers certificates upon graduates at several Thai governmental universities since his early reigning days some 50 years ago, delivered addresses after conferring degrees to graduating students of Kasetsart University which took place at Chakkrabhand Pensiri Pavilion, Kasetsart University in Bangkok on 24 and 25 July 1997. Accompanied by Her Royal Highness Princess Maha Chakri Sirindhorn on both days, His Majesty, after the convocation, delivered the following addresses related to vetiver:

24 July 1997: *"...Every graduate present here today is expected to have received a thorough professional education, but for observational education, each may still be lacking as not enough experience has been gained. Thus, every one ought to pay more attention to the whereabouts of individuals and various surrounding objects, relating to every graduate, not ignoring even minor items. One good example is grasses, which, when thorough attention is given to them, will lead to knowledge. Grasses consist of weeds which are useless and other which are beneficial-such as vetiver which is highly useful in soil and water conservation as it has deep root systems penetrating deep down in the soil beneath it, increasing the water-holding capacity of the soil and its ability to hold soil particles tightly together. It also has compactly arranged stems which act as a barrier to all sediments and debris, and conserve soil surface. Analogous to the aforementioned issue of grasses, individuals may be those who lead a useless life, or others who lead valuable lives. Grasses are an excellent lesson, to be considered as a motto in maintaining individual's lives, i.e. to behave like weeds which cause problems and hardship to the environment, or to behave like vetiver which only creates uses and stability for the land it thrives on...'*

25 July 1997: *"...About those good things which are useful, one must use them properly, based on sound technical principles and on general conditions in order to achieve expected results. Take the example of vetiver. It must be planted closely to form a living wall on contours suitable to the topography of the area. On highlands, for example, it should be planted as contour hedgerows across the slope and gullies; on the plain, it should be planted on the rims of the plot or along furrows of the ridges, alternating with field crops; in catchment areas, it should be planted on the contour as hedgerows above the*



At the Huai Sai Development Study Center, Phetchaburi, His Majesty plants a clump of vetiver to demonstrate how vetiver can create new surface soil, since its roots, upon penetrating deep down, will bring down nutrients with them into the soil. Thus, the soil continues to become more productive; finally the 'bad soil' turns into 'good soil' (14 July 1998).



H.E. M.L. Birabhongse Kasemsri, the Thai Ambasador to the United States of America, receives the Award of Merit from the President of the International Erosion Control Association on behalf of His Majesty at the Awards Banquet held in Indianapolis, Indiana, USA (25 February 1993).

Mr. Richard G. Grimshaw, Vetiver Expert of the World Bank, presents a specially commissioned bronze sculpture of a vetiver plant as an award of recognition to His Majesty for his efforts in the development and promotion on the use of vetiver for soil and water conservation.

area. Vetiver planted according to the above simple methods will prevent erosion of top soil, conserve soil moisture, retain sediments and toxic substances, not permitting them to flow down into water vessels; this will provide considerable benefit to soil and water conservation as well as improve soil and forest rehabilitation. A graduate starting his new working life should study such adaptability and suitability as much as possible, then set it as a principle for him to follow since, during the operation of all work, in addition to having thoroughly useful knowledge and useful thoughts, he should use them adaptively and flexibly in his work, living situation, with regard to individuals and locations, in order to achieve a worthwhile dividend... ".

23 June 1998

His Majesty the King visited the Huai Sai Royal Development Study Center, Phetchaburi Province, and also granted a royal message at Mrigadayavan Palace of Cha-am District, in the same province.

"... Growing vetiver grass to make the soil productive may not be understood by some as to why the soil can become productive. I will explain that, when the leaves of the trees on the mountains fall, the rain will wash them down and we cannot rehabilitate the soil. But we can plant vetiver and create dykes to trap the top soil from flowing into the creeks. The soil will then be restored and that is good for cultivation. If not, top soil, which was once abundant, will flow into the creeks, leaving only sand and hard soil. The creeks may become shallow due to siltation. Then, water flowing from the hill with little trees remaining will rapidly inundate the low-lying land and damage the agricultural products. After a few days, the water will dry up and hence there is no water left for consumption and to sustain cultivation."

14 July 1998:

His Majesty the King paid a royal visit to the Huai Sai Royal Development Study Center, Cha-am District, Phetchaburi Province. On this occasion, he delivered the following royal messages related to vetiver, *"... The reason I am here is because the area with productive soil in Thailand is diminishing. That is why we have to look for the bad-soil area, and then improve it to become productive. This project is important. Various agencies, such as the Land Development*

Department and the Royal Forest Department, should conduct serious studies. If we can do that, we will never be deprived... "

"... Vetiver will retain water and fertile soil from the hill. Hills are the source of water and nutrients. There is no need to bring in fertilizer from elsewhere. Land development is then easy, with little help from the irrigation and forest".

"... We have to make 'the good' on top of 'the bad', but not with this hard-pan soil, because it is infertile and too hard. We have to create new surface soil. When vetiver grass roots penetrate into the soil, they will bring down nutrients with them into the soil, and vetiver will continue to grow. When it rains, the water which flows from the hill will wash down the leaves and stop at the vetiver hedges. The soil will then become productive, and building up. The 'bad soil' will become 'good soil'

Conclusion of the Royal Messages

From His Majesty's messages, it is evident that Thai people are blessed by His Majesty's deep concern on the well-being of his subjects. Especially on the matters concerning vetiver grass which, on some occasions, His Majesty has demonstrated the vetiver plantation himself in order to serve as an example for the farmers.

Resulting from his greatest devotion and diligence, many inspirations have risen among different government agencies and private sectors, in order to efficiently respond to His Majesty's Royal Initiative.

To enable the operation of His Majesty's Royal Initiative, on 24 June 1992, the Prime Minister, as Chairman of the Royal Development Projects Board, appointed the Committee for Development and Promotion of the Utilization of Vetiver Grass According to His Majesty's Initiative. This Committee has the duty to set up policies and goals to steer the operation according to the royal initiative. Later on, this Committee has transformed its status to the Sub-committee on the Technical Aspects of the Planning, Monitoring, and Evaluation of the Development and Promotion of the Utilization of Vetiver Grass According to His Majesty's Initiative, and also appointed two working groups, one responsible for formulating the master plan, and the other

for following up and evaluating the progress, in order to effectively respond to His Majesty's initiative.

After His Majesty had delivered his royal initiative, many agencies promptly responded. The Office of the Royal Development Projects Board (ORDPB) has been the central agency in coordinating and monitoring the projects to follow His Majesty's guidelines.

From His Majesty's 22 messages cited above, 33 agencies which are involved in one way or the other with vetiver grass had pooled together to work and act in response to His Majesty's initiative. The study, research, and demonstration work conducted in many areas of Thailand proceeded very well and the results have been widely transferred to the farmers.

The investigations can be grouped into two categories, those which are basic research and those which are applied research. Since 1993, many researches have been completed and achieved their goals while many are still ongoing.

The utilization of vetiver grass for water and soil conservation has been carried out in many disciplines, such as in maintaining road shoulders, ponds, water delivery canals, dams, around reservoir edges, drainage ways, on sloping agricultural areas, in afforestation, and drilling of hard-pan soil, as well as in other projects according to His Majesty's royal initiatives.

Other usages of vetiver grass came from the leaves and roots which can be used in making handicrafts and basketwork, products for household decoration. Vetiver grass can also be used for mushroom culture, roofing, compost making, and as ground-covered crops. Moreover it can be mixed with water hyacinth to make 'green fuel' which produces less smoke and high heat.

The ORDPB, as the central agency for coordinating the Development and Promotion of the Utilization of Vetiver Grass According to His Majesty's Initiative, has organized three vetiver conferences; two at national and one at international level. The latter, has been known as the First International Conference on Vetiver. It was organized in order to commemorate the 50th Anniversary (Golden Jubilee) Celebrations of His Majesty the King of Thailand's Accession to the Throne. It was held in February 1996 in Chiang Rai Province in

Northern Thailand, under the topic of "Vetiver: A Miracle Grass". During the Conference, academics, officials and staff could discuss matters concerning vetiver grass and also could exchange ideas and share their views and progress achieved by their organizations. The exchange of ideas and knowledge have taken place among 400 participants, both Thai and foreigners. There were 102 vetiver experts from 44 countries participating in the Conference who learned of the progress of vetiver grass work in Thailand according to His Majesty's initiative. ICV-1 has been so successful that the participants unanimously endorsed the organization of the International Conference on Vetiver on a regular interval of four years.

In addition, ORDPB also acts as the vetiver grass information center which is now accessible on the internet. The Homepage of ORDPB is divided into two parts, the Pacific Rim Vetiver Network (PRVN) and Thailand Vetiver Network (THVN).

1. PRVN is the information network system linking information on vetiver grass work of many countries in the Pacific Rim. The founding of PRVN stemmed from Mr. Richard Grimshaw, Coordinator of The Vetiver Network (TVN) who has suggested that Thailand should act as the core for the PRVN, with the principle 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 homepage on the internet.

The PRVN Committee has been appointed on 6 May 1997, with Mr. Manoon Mookpradit acting as Chairman along with many academics and officials from various agencies, while the ORDPB serving as the secretariat office.

There are 800 members from 22 countries including Australia, Brunei, Cambodia, Cooks Islands, China, Fiji, Indonesia, Japan, Korea, Laos, Malaysia, New Zealand, Papua New Guinea, the Philippines, Singapore, Solomon Islands, Taiwan, Tonga, Vanuatu, Western Samoa, Vietnam and Thailand.

As of January 2000, the PRVN has produced newsletters in Thai language, called Bhumivarin Anurak (10 issues have been published) and in English language, called Vetiverim (11 issues have been published), both which come out every three months. Moreover, the PRVN has also published five technical bulletins. Furthermore, the

PRVN has a homepage providing information, activities and news on vetiver grass, accessible on the internet at http://prvn.rdpb.go.th.

The progress of the PRVN is very gratifying. More members from countries which are not within the Pacific Rim, like England and India, have also joined the PRVN. Many people are interested in using vetiver grass, both in Thailand and abroad. Brunei and Cambodia have asked for advice on the variety selection, plantation, multiplication, and buying plant materials for trial plantation. The secretariat office has already provided documents and coordinated with involving agencies to meet their requests.

2. THVN is the information network on vetiver grass in Thailand. It has formulated a database system containing information on vetiver grass which can be obtained on the internet at http://thvn.sut.ac.th. This technology allows quick, efficient, and convenient dissemination of vetiver knowledge and their useful attributes.

The working process of vetiver has been going on step by step. However, from the continuous evaluation of the Sub-committee on the Technical Aspects of Planning, Monitoring, and Evaluation of the Development and Promotion of the Utilization of Vetiver Grass According to His Majesty's Royal Initiative, it was founded that there should be further promotion of the vetiver grass information on a wider scale for farmers, such as the appropriate ways to grow them, its utilization for land and water conservation as well as other purposes. This is especially for those who are living in remote areas, in order to achieve sustainable environmental development. To begin with, the government officials particularly from remote areas should be trained to have the skills and develop a common understanding to enable effective transfer of knowledge to the farmers in rural areas.

From being a relatively unknown plant, "vetiver grass" has now become a very valuable and useful plant that provides many benefits for mankind. At the same time, it was His Majesty the King's influential role and innumerable Royal Initiatives that inspired every government and private agencies concerned to work together in disseminating the successful results of vetiver work in order to achieve the utmost benefits.

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Her Royal Highness the Late Princess Mother, Princess Sri Nagarindra takes Their Majesties the King and the Queen to observe a young vetiver plant with profuse root development at the Vetiver Development Center, Doi Tung Development Project, Mae Fa Luang District, Chiang Rai Province (23 February 1993).

Back cover photo caption:

His Majesty the King pays a visit to the Vetiver Multiplication and Extension Project under His Majesty's Initiative at Pang Tong Highland Agricultural Development Center, Muang District, Mae Hong Son Province (19 March 1992)

The Royal Messages Concerning Vetiver: A Miracle Grass

Office of the Royal Development Projects Board
Bangkok, Thailand
January 2000