

# VETIVERIM

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## Editorial

### Vetiver Newsletter

One of the reasons why vetiver is popular throughout the world in spite of the fact that it was almost unknown 15 years ago, is that vetiver networks have been established at five levels, namely, global, regional, sub-regional, country, and city. Most of these networks have contributed so much to the success of the vetiver programs at their respective levels.

One of the reasons why vetiver networks are successful is the issuance of newsletter to disseminate useful information about vetiver to interested persons. Some of them have continued to issue their newsletter on a regular basis, while a few may have one or the other problems, thus cannot do so.

The Editor has recently made a survey on the vetiver newsletters produced throughout the world. Below is the list of the vetiver newsletters published by their respective networks:

*The Vetiver Network (TVN)*: Vetiver Newsletter: A news magazine promoting the vetiver system. First issue: ?; Latest issue: No. 24, May 02.

*Pacific Rim Vetiver Network (PRVN)*: Vetiverim: A quarterly newsletter of the Pacific Rim Vetiver Network. First issue: Jul. 97; Latest issue: No. 30, Oct. 04.

*European Vetiver Network (EMVN)*: EMVN Newsletter: A periodic newsletter of the EMVN. First issue: Apr. 1999; Latest issue: No. 7, Jun. 02

*Southern Africa Vetiver Network (SAVN)*: Newsletter of the SAVN, First issue: Mar. 97, Latest issue: No. 10, Apr. 02.

*Latin America Vetiver Network (LAVN)*: Boletín Vetiver (in Spanish): First issue: xx; Latest issue: No. 11, May 2003

*Vetiver Network Philippines (VENETPHIL):* Vetiveria: Quarterly newsletter of the Vetiver Network Philippines. First issue: ?; Latest issue: No. 2, June 1997.

*China Vetiver Network (CHVN):* Vetiver Newsletter (in Chinese): First issue: ?; Latest issue: ?.

*Malawi Vetiver Network (MLVN):* Malawi Vetiver Newsletter: First issue: ?; Latest issue: Vol. 2, Issue 1, Jun. 01.

*Thailand Vetiver Network (THVN):* Bhumivarin Anurak, First issue: Oct. 97; Latest issue: No. 17, May 04.

*Venezuela Vetiver Network (VEVN):* Boletín Vetiver De Venezuela: First issue: May 02; Latest issue: Jun. 03.

The Editor admits that he has limited access of the copies of such newsletters available to him. He feels that there should be a lot more newsletters produced by these networks. In order to complete the survey, the Editor requests the coordinators of all vetiver networks to please supply him with the relevant information.

## Vetiver and 'Sikki Art' in the Folk Life of Rural India in the Mithila Region, Bihar\*

Vetiver (locally known as *katara* grass) grows abundantly in the floodplains of Mithila (north Bihar, India). It holds an esteemed place in Indian mythology. Vetiver is used in the centuries old *Sama-Chakeba* festival observed for welcoming the migratory birds in Mithila wetlands during the onset of winter season. The plant is formally worshipped by the women while observing the *Ravi-vrata* as obeisance to the Sun God.

The plant provides raw material to the 'sikki' handicraft industry that has facilitated the economic emancipation of rural women in Mithila area. Antiquity of this folk art in *Mithila* goes back to six centuries since the days of poet Vidyapati, who mentioned the plight of women stalk collectors in his *Maithili* poems.

Rural women collect mature inflorescence stalks of vetiver from the wild mostly during September - October when the rains are over. Exquisite domestic items of both conventional and modern hues are carved out from inflorescence stalks of vetiver after their softening by pretreatment with warm water. The circular stalks with 2 to 3.5 mm diameter are cleaved into two, four, eight or even sixteen pieces depending upon the artist's capacity to use the fineness. The partitioned strands are intricately woven around a grassy base made of other poaceous grasses with the help of a specific needle. Using over two-dozen designs various types of containers, fans, wall hangings etc are carved. Social scientists are of the view that some of these designs resemble those found in the clay potteries and coins obtained in Harappa excavations. Some plant-based designs include those of the leaves of *Ipomoea aquatica*, flower of *Benincasa hispida*, fruit of *Trapa natans* etc. Fast colors are applied to the *sikki* items through hot water treatment with common salts also dissolved in it. Earlier a dye obtained from the bark of *Artocarpus lakoocha* was used to color the *sikki* gadgets.

*Sikki* items are almost immune to pest attacks, which could be ascribed to the presence of pesticidal principles in the plant. Investigations are required to decipher the genetic diversity in its populations with a view to ascertaining the quantum of inherent pesticides as well as those of fragrant oils. Certain new initiatives in fashion designing have witnessed blending of *sikki* with jute items. Madhubani based voluntary agencies like *Sewa Mithila*, *Adithi*, *Gramin Vikas Samiti*, etc. are promoting this essentially rural craft through cooperative endeavors. Exquisite wall hangings carved by the *Rachana Sikki Hasta Kala Kendra* near Sarisabpahi in this district are selling at the price of one to two thousand rupees (ca. US \$ 20 - 40) for a single item. *Sikkiware* are getting popular through exhibitions at national and international levels. *Sikki* art has removed the penury of a good number of women artists. Nuna Khatoon and Gulesha Khatoon are some worth quoting women artists who after initiating from a level of abject poverty have now earned prosperity for their families. *Sikki* artists like Kumudini Devi of Sursand (Sitamadhi district) and Sudama Devi of Raima (Madhubani district) have won national awards. The latter was conferred 'Padmashri' – a national Civilian Honor from the Government of India in recognition of her excellence in this art. This intricate art requires more time and patience. The artists often achieve perfection and excellence when they are in an advanced age. Needle work often leads to impairment of their vision.

Vetiver is a source of perfumed oil and is widely used as a cold beverage. *Ayurveda* holds it as a remedy for skin infections including that of leprosy. It provides an antidote to snake bite and also helps check the tendency of abortion. The slender leaves emerging after decapitating the older portions of the plant are fed to the cattle in combination with other fodders. There is a need to investigate whether the mention of *khus* seeds as the lowest unit of measurement in the ancient Indian text of Economics - the '*arthashastra*' by Kautilya bears a reference to the minute vetiver seeds. Vetiver as a potential agent of phytoremediation could also provide a solution to the recently discovered arsenic contamination in the drinking water of West Champaran and Bhojpur districts in the State of Bihar.

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## Vetiver System for Embankment Protection of Niu He Expressway\*

**Abstract:** This paper described the basic characteristics of soils of a section of the expressway embankment which was most subject to collapse. The factors leading to collapse were discussed. The results showed that vetiver grass adapts different environment and could form dense living hedges in a short time. It could not only control soil and water erosion, fix the slopes but also green up the embankment. The study provides a base for the application of the Vetiver System and its extension as a cheap bioengineering measure in Jiangsu province and northern sub-tropical China.

**Key words:** Vetiver System, slope stabilization, road construction.

### INTRODUCTION

Vetiver grass (*Vetiveria zizanioides*) belongs to the genus *Vetiveria* of the family Poaceae. It is a perennial grass. Since it has deep strong roots that have many beneficial characteristics, it was welcomed by researchers in many countries in the world and has become a famous plant for soil and water conservation and slope stabilization. Vetiver Grass Technology (VGT) refers to the technology using vetiver grass for erosion control and slope stabilization. During ICV-2 held in Thailand, VGT was changed to the Vetiver System (VS), referring to “the low-cost, simple technology employing live vetiver plant for soil and water conservation, environmental protection, and remediation of deteriorated or contaminated land and water”(Chomchalow 2003).

Supported by The Vetiver Network (TVN), China Vetiver Network (CHVN) was launched in Soil Science Institute of Chinese Academy of Science in 1996 (Xu 1998). In October 1997, supported by the World Bank, the International Vetiver Workshop was organized in Fuzhou by CHVN in order to evaluate experience in vetiver research and application in China in the past decade since Mr. Dick Grimshaw introduced vetiver into China in 1988. At this Conference, a Thai expert, Diti Hengehaovanich, introduced his successful experience in vetiver application for highway embankment protection in Malaysia (Hengehaovanich 1998). In order to extend his success, CHVN organized the International Conference on Vetiver Bio-Engineering Technology for Erosion and Sediment Control and Civil Construction Stabilization in Nanchang City in 1999. In this Conference, recognized international experts were invited to share their experiences. After the Conference VS has been rapidly distributed in the fields of highway and railway protection, mining and quarry re-vegetation, and environmental protection (Xu 2002). Later in 2003, ICV-3 which was held in Guangzhou, China, played an important role in VS dissemination in China. It promoted the function of private companies to extend VS in China and the World.

### MATERIALS AND METHOD

#### The Embankment Studied

Altogether eight embankments were selected through investigation along Niu He expressway that connected two capitals of Anhui Province and Jiangsu Province and proved to be unstable and subject to collapse in the past years. The investigation included slope, vegetation, erosion, stabilization, etc. At last, three most unstable cuts with a height of 10-14 m were chosen for the research. Their description is given in Table 1.

#### Vetiver Test

To protect the slopes, bare-root vetiver was planted from 31 March to 6 April 2004 at the spacing of 1 m between rows and 10 cm within a row. There were six tillers for each clump. Watering was provided after the planting. Because of draught, irrigation was provided every 2-3 days from 8 to 18 April until a heavy raining on 18 April. Urea fertilizer (60 and 80 kg) was applied on 27 May and 23 June, respectively.

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Table 1 Basic conditions of 3 cuts along NiuHe expressway

No	Direction	Gradient	Area (m <sup>2</sup> )	Description
JP03-1	South	around 25°	3000	Irregular slope, serious sheet erosion with small gullies, obvious gaps subject to collapse, some rockcrop of sandstone
JP03-2	South	around 20°-30°	2500	Smooth slope, occasionally steep, serious sheet and gully erosion, a patch of land moved down a few centimeters for decades, a few of natural plants in some places, a lot of stone and fragments along the road ditches in the lower part of the cut
JPO3-3	North	around 20°-30°	2500	Rough slope, steep in some place, serious sheet erosion without plants in some places

Table 2. Mechanical analysis of soils of 3 cuts

No.	Depth (cm)	Coarse particle (%) (>0.2mm)	Particle size (%)			Texture
			2~0.02 mm	0.02~0.002 mm	<0.002 mm	
JP03-1	0-20	0.35	26.33	35.60	38.08	Loamy clay
	20-40	0.19	29.20	34.26	36.54	Loamy clay
	40-60	0.10	31.50	33.70	34.80	Loamy clay
	60-80	0.39	28.95	34.71	36.34	Loamy clay
	80-100	0.31	27.58	35.07	37.35	Loamy clay
JP03-2	0-20	1.47	27.34	36.69	35.98	Loamy clay
	20-40	1.12	28.11	35.92	35.98	Loamy clay
	40-60	0.35	28.27	33.70	38.04	Loamy clay
	60-80	0.69	27.82	34.71	37.47	Loamy clay
	80-100	0.93	25.12	34.95	39.94	Loamy clay
JP03-3	0-20	0.16	30.08	34.71	35.21	Loamy clay
	20-40	2.58	31.82	34.46	33.71	Loamy clay
	40-60	0.91	26.61	28.69	44.70	Loamy clay
	60-80	1.05	28.11	29.82	42.08	Loamy clay
	80-100	3.64	29.64	31.64	38.72	Loamy clay

To monitor the growth of vetiver grass, 30 clumps of vetiver was selected at random for each cut and investigated every 16 days.

To investigate the effect of planting density on vetiver survival and growth, following treatments were established: (i) On the slope of JPO3-2, two plots with an area of 5m x 5m each were designed; one at the planting spacing of 10 cm within rows, and another at 20 cm, (ii) Similarly,

on the slope JPO3-3, two plots with an area of 5m x 5m each were also arranged; one with 3 tillers/clump, and the other, 6 tillers/clump. Protection belts were arranged on the upslope of all four plots with high density vetiver to protect water and sediments moving downwards.

## RESULTS AND ANALYSIS

**Physical and Chemical Properties of Soils:** Mechanical analysis of soils of the three cuts is shown in Table 2. It was found that the coarse particles >0.2mm of all three slopes were quite low, in particular, slope JPO3-1. On the contrary, clay particles <0.002mm of the three slopes were high.

Table 3. Chemical analysis of soils of the three cuts

No.	Depth (cm)	Organic matter (gkg <sup>-1</sup> )	Total N (gkg <sup>-1</sup> )	Soluble N (mgkg <sup>-1</sup> )	Total P (gkg <sup>-1</sup> )	Soluble P (mgkg <sup>-1</sup> )	Total K (gkg <sup>-1</sup> )	Soluble K (mgkg <sup>-1</sup> )	PH (water) (1:2.5)	CEC (C <sub>mol</sub> (+) kg <sup>-1</sup> )
JP03-01	0-20	8.44	0.608	93.1	0.558	3.57	17.72	104	6.61	15.96
	20-40	3.87	0.357	71.8	0.800	6.85	18.82	118	7.00	17.03
	40-60	3.26	0.306	38.6	0.926	11.60	18.90	128	7.31	17.18
	60-80	3.38	0.291	30.6	0.908	11.22	19.75	134	7.46	16.84
	80-100	2.61	0.288	27.9	0.911	11.90	19.94	136	7.41	17.24
JP03-02	0-20	6.62	0.483	54.5	0.690	6.14	17.48	108	6.91	16.29
	20-40	4.02	0.374	41.2	0.643	6.08	17.17	108	7.07	17.34
	40-60	1.94	0.236	25.3	0.250	3.30	16.54	108	7.81	20.38
	60-80	1.57	0.222	20.0	0.247	2.64	15.30	106	7.99	19.53
	80-100	1.46	0.219	17.3	0.222	2.42	14.36	106	8.06	21.05
JP03-03	0-20	4.67	0.462	49.2	0.929	7.12	19.52	108	7.44	16.29
	20-40	2.25	0.278	34.6	0.563	8.32	17.49	108	7.75	16.10
	40-60	1.89	0.257	31.9	0.348	5.48	16.48	120	8.05	20.57
	60-80	1.80	0.247	29.3	0.301	3.57	15.62	122	8.09	21.24
	80-100	1.54	0.248	26.6	0.313	2.56	16.24	128	8.14	20.94

Table 4. Survival rate of vetiver 22 days after planting

Cut NO.	Splits investigated	Splits survived	Survival rate (%)
JP03-01	231	213	92
JP03-02	200	160	80
JP03-03	206	169	82
Total	634	542	85 (average)

Table 5. Vetiver growth of different planting spacing\*

Clump spacing (cm)	Survival (%)	Height (cm)		Tillering (tillers/clump)	
		average	highest	average	highest
10	95	70	90	2.7	5
20	85	70	90	2.5	5

\* Investigated on 14 June 2004

Table 6. Vetiver growth of different tiller number in each clump during planting\*

Treatment (tillers/clump)	Survival (%)	Height (cm)		Tillering (tillers/clump)	
		average	highest	average	highest
3	80	45	60	2.5	5
6	93	45	65	4.5	6

\* Investigated on 14 June 2004

Table 3 shows chemical properties of the two cuts. The table reveals that the soil pH between 6-7 is suitable for most plants to grow. It does not affect vetiver grass. The content of soil organic matter ranges from 1.46 to 8.44g/kg. It differs from slope to slope; the Slope JP03-1 has the higher content while Slope JP03-3 has the lowest. Meanwhile, Slope JP03-3 has low total N and soluble N. In general, the content is within the medium range in Jiangsu Province. But total P content is lower than most alluvial soils in Jiangsu Province. Table 3 reveals that the figures change from top to bottom regularly, which indicated that the slopes were not disturbed much. According to the pH and organic matter values, there was biological soil formation process in the upper soil horizons which would benefit vetiver growth. There is little change in the soil profile in total K content that may be influenced by soil parent materials derived from fine sand-shale rock.

### **Survival and Growth of Vetiver**

It is a common condition that there is a long period between planting and the initiation of vetiver growth. In this project, within one week after planting almost all grass wilted. However, a few small leaves appeared green or yellow in each clump. About 20 days later after planting, the grass started to resurrect and the young leaves turned brown and dark green (Table 4). Some young shoots grew up from the top of the cut stems. Investigation on 28 April 2004 showed that 85% of vetiver slips survived and turned green. Later, more slips became green. Upto the end of June, around 95% vetiver survived. This indicated that bare-root vetiver could reach high survival rate if the planting procedure was done correctly.

### **Vetiver Growth and Its Effect on Slope Stabilization of Different Treatment**

The effect of planting density on vetiver survival and growth is shown in Tables 5 and 6. The survival rate of vetiver planting spacing of 10 cm between rows was higher than that of 20 cm, possibly because in the high density planting pattern the micro-environment (temperature and moisture of soil and above ground) changed and benefited vetiver growth. Table 6 indicates that more tillers in a clump also benefited vetiver growth and enabled vetiver hedge formation and slope stabilization to accomplish earlier.

### **Effect of Vetiver on Water Conservation and Slope Stabilization**

In the beginning of July, vetiver grass hedges were basically formed with a height of 100 cm. The roots were also around 100 cm. It was impossible for a person to pull them up. Before planting there were some unstable appearance on the slopes. There were gullies and gaps that were tens of meters long and 60 cm deep. However, there were no more new gullies or gaps since vetiver hedges formed, despite the fact that there were rains in June and July. Similarly, tests in the Mofu Mountain of Nanjing showed that two-year old vetiver hedges could trap sediments very successfully. A 1-m hedge could trapped sediment for hundreds of kilograms with a thickness of over 20 cm.

## **CONCLUSION AND DISCUSSION**

Vetiver is easy to plant and manage. So long as it is planted according to planting procedure, a high survival rate can be reached. If water and nutrients were adequate, the grass can form hedges in a short time. Vetiver has beneficial mechanical characteristics, and it cannot only stabilize embankments and therefore replace concrete walls of the skeletons, but also can green up the slopes.

If the embankments contained much sands or silts, they would be subject to collapse. However, as it contains much clay as shown in this paper, it could also be subject to collapse. In this case, during the raining season the soil would soak much water, leading to large volume that would cause a unstable slope. This kind of situation may be related to the type of clay minerals.

Once vetiver grass was planted and grew up, the micro-ecological environment would be improved and other plants would also grow up between vetiver rows, and therefore, the whole embankments would green up, forming beautiful slopes.

If the embankment is very large, drainage ditches should be established to drain exceeded run off.

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### **Seminar on Vetiver Planting Techniques for Roadside Slope Protection\***

A Plenary Session of Road Technique Committee under the Jiangxi Provincial Highway Society, together with a Seminar on Vetiver Planting Techniques for Roadside Slope Protection, was held in Jingxian, Jiangxi Province simultaneously from 22 to 23 July 2004. These two meetings were jointly held by the Road Technique Committee under the Jiangxi Provincial Highway Society, and the Highway Technology Department under the Jiangxi Provincial Center for S&T Consultant and Service. There were altogether 48 persons, including heads of Highway Bureaus, Transportation Bureaus, Highway Project Administrations, and Highway Design Institutions from nine cities as well as commissaries concerned, attended the meetings. Programs of the meetings were quite compact and tense. In the evening of the first day, arrangements for roadside slope protection with vetiver techniques and road construction in the year of 2004 were discussed in the plenary session of the Road Technique Committee.

On 23 July, a seminar on “Vetiver Planting Techniques for Roadside Slope Protection” was held. Chairman of the seminar was Senior Engineer, Fu Hengsheng, who is the Acting Director, Vice Chief-Secretary, Jiangxi Provincial Highway Society, and Director of the Road Technology Department under the Society. The papers presented were: (i) Present Statue, Effects and Keys to the Technique of Roadside Slope Protection with Vetiver; (ii) Slope Protection with Contour Vetiver Hedges in Highway Projects; (iii) Some Experiences on Vetiver Planting at Roadsides along Dongxiang-Linchuan Grade One Highway; (iv) Preliminary Study on Bio-engineering Designs for Roadside Slope Protection Projects; and (v) Off-season Practice and Applications of Vetiver Hedge Technology for Slope Protection. Prof. Lu Shengluan from Jiangxi Provincial Institute of Red Soils, the one who received the King of Thailand Vetiver Award during ICV-3 in Guangzhou, was one of the speakers. There were a lot of comments and lively discussions following all presentations.

Arranged by organizers, the meeting attendants, ignoring the high temperature, visited the sites along Dongxiang-Linchuan Grade One Highway for roadside slope protection projects with vetiver planted in early April 2004. Visitors were quite exciting when they saw the 100-day old vetiver grew very well and the hedgerows had been well established. They found that the newly formed vetiver hedges began to effectively protect the roadside slopes when roads were attacked by several strong rainstorms. By contrast, they found that Bahio grass planted just side by side with vetiver planting sites and covered by geojute almost totally died and hardly survived during the hot summer. Moreover, lots of small gullies were formed as the result of erosion at the sites where vetiver was not planted. Consequently, the visitors commented that, “It is a really fantastic idea to plant vetiver”.

Mr. Xi Fangbai, Deputy Director, Transportation Department of Jiangxi Provincial Government and the Director, Jiangxi Provincial Highway Society, attended both meetings. In both papers he presented at the meetings, he pointed out that the techniques for slope protection with vetiver system were quite sophisticated, low cost, easy applicable and highly effective. He asked all cities and counties to adopt, apply, and extend these techniques according to their own conditions, and try to transfer these techniques into real productive forces. Mr. Yu Xuefeng, Director, Division of Science, Technology, and Education under the Transportation Department, and Mr. Lu Qiaojin, Deputy Head, Jiangxi Provincial Highway Bureau, asked all organs and areas concerned to contribute jointly to ascelerate promotion for the application of vetiver system so as to make these techniques useful in the Province's construction of ecological highways.

Early in March 2003, Jiangxi Provincial Society issued a document (JHS 9-2003) entitled, "A Notice on the Extension and the Application of Bio-engineering Vetiver Techniques". The document stressed that, "For rising the contribution rate of science and technology to Jiangxi Province's economy growth, and as the first step for transferring S&T achievements into real productive forces, the Society decides to recommend and extend the bio-engineering vetiver techniques. The aim of the application of these techniques is to fix soils, stabilize slopes, save funds and protect environment in an ecological way. We should begin a wide propaganda movement so as to promote and extend the

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*\* By Lu Shengluan (translated by Xiong Guoyan) Redsoil Research Institute of Jiangxi Province, Jingxian, Jiangxi, China.*

bio-engineering contour vetiver hedge techniques according local conditions." Five detailed guidelines were also included in the document. Besides, another document entitled, "An Introduction to the Bio-engineering Vetiver Techniques", prepared by the New Highway S&T Achievements Extension Station, was also attached in the above mentioned document and forwarded to the readers.

At the same time, another document (JTSTE 2-2003) entitled, "A Notice on the Extension and the Application of Bio-engineering Vetiver Techniques" issued by the Transportation Department of the Provincial Government pointed out that the key S&T project, "A Study on Highway Roadside Slope Protection with New Vetiver Hedge Techniques" which was supported by the Transportation Department has achieved countrywide advanced results and received already a Grade 3 Award issued by the China Highway Society. These results have been applied in some departments in the highway sectors in Jiangxi Province, and have turned out fairly high economic and social efficiencies. In 2003, these results were listed in "A Collection of Excellent S&T Achievements in Transportation Industries in the Period 2000-2002", published by the China Transportation Ministry, and recommended to be extended. At present, the New Highway S&T Achievements Extension Station under Jiangxi Provincial Society is extending the application of bio-engineering vetiver techniques. It is hoped that departments concerned should strongly support this extension work if conditions are adequate.

These two documents have ascelerate the pace of extension of vetiver systems in highway roadside slope protection. According to a rough statistics, the area of highway roadside slope protected by vetiver bioengineering techniques amounts to 1.5 million m<sup>2</sup>. The task of these two meetings is to check the real results turned out by the above mentioned documents, and to exchange experiences and practices of the past year. It is believed that these two meetings will greatly promote further extension of vetiver contour hedge techniques for highway roadside slope protection, and create a new hot wave of this extension.

<b>Vetiver Grass Technology Training Program by ICDC</b>
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The International Center for Development Communication (ICDC) at Kasesart University, Bangkok, Thailand shall conduct a "Vetiver Grass Technology Training Program" for four implementers from East Timor between 11-22 October 2004. The aim of the training is to provide the

participants best-practice management of vetiver grass technology. Corollary to the main focus of study, concepts and practices in agricultural extension and farmer group participation processes as well as monitoring and evaluation of programs will also be included.

The program will be a blend of theory and practice. The technical input comprises lectures on:

- (i) Vetiver System in Thailand by Dr. Weerachai Nanakorn
- (ii) Propagation Technique by Dr. Monkol Panichkul
- (iii) Tissue-culture Technique by Assoc. Prof. Malee Nanakorn.

Field trips to various vetiver planting sites and discussion with resource persons from agencies provide participants with insights on vetiver technology and management. The sites visited included

(i) Khao Hin Son Royal Development Study Center to observe the strip-planting method of propagation for field planting and to understand His Majesty the King of Thailand's management model 'Single Management Model or Unity Administration'.

(ii) Land Development Regional Office to see how community participation and farmer extension concepts were applied.

(iii) Department of Industrial Promotion to see Thailand's vetiver handicrafts.

(iv) Queen Sirikit Botanical Garden to see tillers planting in biogradable nursery blocks.

(v) Highland Development Department Regional Office to visit vetiver project sites.

(vi) Huai Hong Krai Royal Development Study Center to see how the concepts of community participation and self-reliance and self-sufficiency strategies were applied.

(vii) The Pacific Rim Vetiver Network (PRVN) Office to discuss the information flow and the method for the collection and dissemination of information.

At the end of the program, draft plans for implementation back on the job will be prepared and presented.

<b>Danish Red Cross Vietnam Supported a Vetiver Grass Project for Natural Disaster Mitigation in Nam Dinh Province*</b>
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*From 5-7 August 2004, on the invitation of the Danish Red Cross Vietnam (DRCV), we took part in an inspection at seven communes of Hai Hau district, Nam Dinh province, to assess the effects of natural disasters and prepare sites for a pilot project using Vetiver grass for DRCV.*

### **State of the art of natural disaster in Hai Hau and the inappropriate application of vetiver**

Our first impression was that natural disasters in Hai Hau are quite severe, but natural disasters in the Red River Delta are less severe than in the coastal provinces of Central Vietnam, where the natural disasters are mainly coastal and riverbank erosion. Here floods do occur but mostly in the form of short inundation due to heavy rains/storms. As the area is open to the sea and river network close by and thank to the good drainage system, flooding is not a very important issue. Nevertheless, inundation sometimes does cause severe damages in the downstream part of the Red River Delta when the long lasting, heavy rain/storms exceed the drainage capacity, with the 2003 event as a very typical example.

The most severe disaster is perhaps the coastal erosion, or more correctly, erosion of the sea dyke system, whose damage is therefore most tangible (the dyke construction cost plus some local infrastructure, e.g. churches, houses, shrimp ponds, etc.). The sea dyke system has been built very long time ago, perhaps since the French colonial time or even earlier. The outer sea dyke is about 2.5-3.0 m high, the crest is about 4 m wide, and the slopes are 1:1 or even gentler. The inside face is covered with grass or wild pineapple but the seaside is very expensive to build and stabilize. A lot of money has been probably paid on that, including the rock (limestone) rip-raps, about 10 years ago. But people had to abandon this dyke and build another inner dyke, about 200-300 m back to the field, which is about the same size and design. It is interesting to notice the rounded limestone gravels used in the rip-raps, about 10 cm in diameter, these were derived from sharp-edged,

20x30x40 cm in size about 10 years ago, so you can imagine the disastrous destructive power of the sea wave. Now the rock rip-rap has collapsed due to soil erosion underneath. Relics of groynes are still here and there. The area in between the outer and inner dykes looks as if it was bombed, with relics of churches, houses, wells, either abandoned or dug for what can be reused (bricks, tiles, etc.). New houses are being built back inside of the inner dyke thanks to the DRCV, and new churches too, thanks to some support from the Vatican and contribution from poor farmers.

Our second impression is that the local people seem to be very much aware of natural disasters. Unlike those in Central Vietnam or the Mekong Delta who are less prepared. On top of the well-tied palm leave roof, they put an additional fish net and thoroughly tie it down, a very innovative idea. I never saw such roof before. Then there are concrete boats everywhere, for both daily use and emergency cases. And everybody knows about the rules of dyke protection, that nothing harmful should be done to the dyke, etc.

Our third impression, very interesting, is that perhaps the local people have realized the ineffectiveness of the traditional method of building the sea dyke system, using embankment soil, rock rip-rap and groynes. More and more casuarinas, bamboos, etc. are planted. There is almost no bare soil unplanted with some trees, if not for disaster mitigation then also for harvesting either grain, root, trunk or even leave. *And especially, where it was planted, the local people are very enthusiastic with the vetiver grass. A very good and surprising news.*

It turned out that vetiver grass has been introduced quietly by the Dyke Department into the Hai Chinh commune since mid-2002. About 10-12 rows of grass were planted along 1 km of the field side slope of the sea dyke. Another new section was probably planted in mid-2003 and replanted gaps. And very recently, perhaps just about 2-3 weeks ago, another new section was planted. In total, about 3 km of dyke (the inner side) has been planted with vetiver grass, costing

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*\*By Tran Tan Van, VNVN Coordinator*

about US\$ 4,500/km. *After 2 years, the grass grows very well, forming big clumps and the local people can already witness its advantages compared to other local varieties in controlling erosion and landslip.*

However, the way the Dyke Department introduced the grass is exceptionally poor. Perhaps they organized a bid, or they just contracted a company to do the planting, a pharmaceutical company from Thai Binh, which is currently producing oil from the vetiver grass. So the company delivered slips from Thai Binh to the site for planting. In short, the project is managed directly by the Dyke Department. The local authority and people are just outsiders, they don't even know exactly when the grass was/is planted. They are just warned about their responsibility to look after the grass. It seems that disaster mitigation is not the community responsibility. The dyke is somebody else's property and the local people just have to obey the Government's decree to protect it. Nobody can encroach the dyke but nobody either can try to protect it by other methods than those instructed by the Dyke Department.

There has never been, of course, a discussion on setting up local nurseries. Local people said the planters just trimmed some seedlings from big clumps and replanted to other places, bare rooted. The grass was/is planted about 25x25 cm. In other words, using the same pattern for nurseries or for root harvesting, not aiming at having a close hedge at all. As a result, although each clump is quite big, no close hedgerow is formed. *Nevertheless, the grass helps stabilize the dyke, something that is widely recognized by the local people, compared to other types of local grass or wild pineapple, etc.*

Looking at newly planted rows one can conclude that inappropriate technique has been applied. With the 25 cm spacing, of course no furrows were made, no weed control, neither good soil nor manure nor lime were added. A hole is simply made by shovel and a clump inserted, and no daily

watering. Local people did recall that the contractor brought in a watering truck for the first planting day, but nothing more. Obviously this is the reason of many gaps and replanting later.

Last but not least is the planting was mixed with the local *Phragmites* ('Co De'), which looks similar to the vetiver, just darker green. In particular, the local grass is perhaps evergreen and doesn't dry up after several months as the vetiver grass, but 'Co De' does not have a deep enough root system.

In conclusion, the work done is not good in terms of both technique and community participation. In that case it is quite expensive, with US\$ 4,500/km for 10-12 widely spaced rows, without watering, caring and fertilizing etc. No closed hedgerows have been formed. And if there were heavy storm right now then the vetiver grass would have been once again blamed for its ineffectiveness.

Only one thing that this project achieved was to convince the local people about the advantages of the vetiver grass. They are eager to plant it.

### **A new DRCV (Danish Red Cross Vietnam) pilot project**

From 1-3 September, a new DRCV funded pilot project will start. DRCV has asked VNVN to come along to advise on the technique. Four sites were selected including a riverbank section, a river dyke section, under the bamboos, an inner sea dyke section and a shrimp pond section. Two more sites are to be planted within a month, when the last high tide of the year is over. And these two sites would be along the seaside of the outer abandoned sea dyke.

The seedlings were bought from the nursery of NISF, who transported cut clumps to the sites one or two days before. *An important warning was made not to mix the supply with the native vetiver grass and it seemed to work.*

Before planting at each site, we were asked to make an one-hour introduction to the local people, followed by *in-situ* planting practice, starting with clump division, cutting, trenching, soil and manure adding and planting. In total about 1.5 km of vetiver grass was planted.

A nursery, about 300 m<sup>2</sup> was also set up, and pots were prepared for planting two other sites in a month. We were a bit concerned about the success of these two sites and tried to ask DRCV to go slow first, but they still wanted to go ahead.

*Anyway, with four other sites, we are quite sure about the success.*

### **Vetiver Used in the Conservation and Rehabilitation Project in Thailand**

In order to celebrate Her Majesty the Queen of Thailand's Sixth Cycle (72th) Birthday Anniversary, the 1<sup>st</sup> Army Area organized the activities for the conservation and rehabilitation of the area of Nang Phanthurat Mountain, which is located at Khao Yai Sub-district, Cha-am District, Phetchaburi Province, with full cooperation from seven government and private agencies. Starting on 11 August 2004 (one day before the birthday of Her Majesty), the Phetchaburi Provincial Army Administration organized a campaign to grow vetiver in the areas of Nang Phanthurat Mountain where problems of soil depression, soil erosion, and gully erosion have occurred. The vetiver planting material (10,000 slips) has been provided by the Phetchaburi Land Development Station. In fact, this Station has planted vetiver in this area since 2002 up to the present. It also organized training on the use of vetiver for soil and water conservation, in addition to a few other courses on how to make organic liquid fertilizer and composts by small farmers.

### **Letters to the Editor**

### **Report on the Visit to Venezuela**

Referring the report of your visit to Venezuela (*see Vetiverim 29 - Ed.*), it is totally absorbing and fascinating. I like the approach of going for the handicraft first, and subsequently soil conservation and erosion control. We made a stab at that approach in Senegal, but it did not make lift-off, not because the concept was flawed, but because there was not enough experience in weaving-type handicraft; where it existed it was the work of men, and they had a plentiful supply of palm leaves that were more easily available than vetiver.

Congratulations on giving us a front-row seat at each of the step of your travel.

Criss Juliard  
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*The Editor totally agrees with you, as this is also true in Thailand because we also have so many kinds of natural fibers that could be used as raw materials for handicraft-making. However, as vetiver is durable, beautiful, and easy to work with, I am sure we can make it in Thailand as well as in many other countries (other than Senegal), provided that the materials are available at a low price. There should be a campaign for public agencies to plant vetiver on any large construction areas where the lands are open and allow or even encourage villagers to harvest the leaves every few months, either to make their own handicrafts for sale or to sell them to the fiber-board factories. -Ed.*

## **The World Association of Soil and Water Conservation**

I wish to ask for your kindness to please convey a couple of messages to inform the readers of *Vetiverim*, mainly those who have participated in the ICV-3, as follows:

*The World Association of Soil and Water Conservation (WASWC)* has opened up a new photo website at <<http://community.webshots.com/user/waswc>>, with more than 1,300 pictures at present (will post up to 3,000 as the maximum) – all concerning soil, water, plants, forests, conservation, organizations, etc., with captions to explain every photo. Anyone, member and non-member, is invited to browse and if you wish you can download them for your use freely – as this is a community service of WASWC among several that we have been providing. Among 55 albums there are two of them that deserve attention of vetiverites, i) Album <<http://community.webshots.com/album/1512552900TUWpb>> that shows vetiver plants and their use, mainly in soil and water conservation, and ii) Album <<http://community.webshots.com/album/194175324DjZIWf>> that shows photos from the ICV-3 in Guangzhou, China from October 5-9, 2003 provided largely by the RDPB. The WASWC considers these two albums as a supplement to those provided by PRVN and other vetiver networks (RDPB has an excellent photo archive at <[http://prvn.rdpb.go.th/picture\\_archive\\_cate.php?PHPSESSID=1332a9bf839fb144f218049989a5c503#](http://prvn.rdpb.go.th/picture_archive_cate.php?PHPSESSID=1332a9bf839fb144f218049989a5c503#)>, which contains 12 albums of various aspects of the vetiver).

However, these two albums are still at a juvenile stage, therefore we would like to ask for help from members of PRVN and other vetiver networks to please send your digital photos, with necessary captions, that may fit the themes of the two abovementioned albums (or other albums on the website) to us so we can post on the respective web pages for common use. Especially for those who participated in the ICV-3 and took many pictures at the conference venue at Guangdong Hotel in Guangzhou and/or during the field trip and the extended trip (October 9-12, 2003), we would be grateful if you could send some pictures that are of interest - either technically and socially or both.

Late last year WASWC had invited all participants to the ICV-3 to be its complimentary members for one year at no cost. After we sent out the WASWC Newsletter to them a large number of mails bounced back, meaning their e-mail addresses either were not valid or were full. We therefore would like to announce that, if any of the ICV-3 participants did not get their WASWC Newsletter please check the validity of their mailboxes and send us the valid addresses soonest. In every issue of our newsletter, starting issue 20(3), you can read an article on Vetiver Highlights by Dick Grimshaw, Chairman of The Vetiver Network. Also starting the same issue, members can read

the newsletter in Spanish edition, where the versions in French and Chinese will be available later this year.

Samran Sombatpanit, Assistant Editor and WASWC President  
sombatpanit@yahoo.com

*It is with great pleasure that the Editor publishes this letter as he feels that the service available from WASWC is fantastic. This is another source of information about vetiver, especially the one concerns with soil and water conservation. -Ed.*