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Editorial

The Fourth Thai National Conference on Vetiver

The Office of the Royal Development Projects Board, the Thai government's coordinating body for vetiver research and development in Thailand, has already organized four Thai National Conferences on Vetiver during the past ten years. The first was held at Dusit Resort in Chiang Rai, 21-22 September 1993; the second at the Regent Hotel, Phetchaburi, 24-26 August 1994; the third at Kasetsart University in Bangkok, 14-15 January 1999, and the fourth at the Rama Garden Hotel in Bangkok, 28-29 November 2002. It should be noted that prior to each of the Thai scientists to participate in the International Conference. Like its predecessors, the 4th Thai National Conference was held in order to prepare the Thai scientists for the forth-coming Third International Conference on vetiver (ICV-3), to be held in Guangzhou, China, 6-9 October 2003. The practice of organizing the national conference prior to the international one is a good custom, since it creates an awareness of the importance of the international conferences. In this way, scientists of various agencies have a chance to prepare themselves to attend the international conference and to start preparing their papers for presentation, provided that there has been some research conducted sometimes ago. Of course, a greater number of scientists are not planning to attend the international conference. Yet the organization of a national conference is of considerable advantages to the vetiver scientists as well as the engineers as they could listen to the progress in their fields as well as to exchange their views with fellow 'vetiverites'.

It can be said that the recently concluded the Fourth National Conference on Vetiver has achieved its main objectives, which include "presenting the results of the implementation of vetiver works undertaken by various governmental agencies and presenting the problems and obstacles encountered for the dissemination of vetive, and how to solve them, to the farmers and other users". Another objective of the Conference, as was mentioned earlier, was "to prepare the Thai vetiver scientists for their participation in the ICV-3, to be held in Guangzhou, China in October 2003".

Vetiver Glossary 7: Terms Related to Vetiver and Water-1. Water Quantity

This is the seventh part of the series on Vetiver Glossary. The first part, "Vetiver and Its Related Terms:", was published in Vetiverim 15; the second part, "The Vetiver System", in Vetiverim 16; the third part, "Species and Related Taxa", in Vetiverim 17; the fourth part, "Use and Utilization of Vetiver" in Vetiverim 18; the fifth part, "Vetiver Propagation" in Vetiver 19; and the sixth part, "Vetiver Parts Used in Propagation" in Vetiverim 22. The format used includes the definitions from: (i) Webster's New World

Dictionary, Third College Edition, (ii) <www.dictionary.com>, and (iii) the Editor's, known as Vetiverim's. Their explanations are also provided.

The present glossary is the first part of the terms related to vetiver and water which deals with water quantity. The second part, which will be presented in the next issue of Vetiverim, deals with water quality.

Aquifer:

Webster's: *n.* an underground water layer of porous rock, sand, etc. containing water, into which wells can be sunk

www.dictionary.com's: an underground bed or layer of earth, gravel, or porous stone that yields water; an underground bed or layer yielding ground water for wells and spring, etc.

Vetiverim's: and underground layer of porous rock, gravel, etc. that yields underground water

Explanation: In some areas of the earth there exists an underground layer of rock, gravel, sand, etc. that contains water which can be sunk. This amount of water is useful as a source of underground water, which normally rises up by capillary force to provide moisture to the topsoil. It can also be pumped up for domestic or agricultural uses. Rainwater normally replenishes the ground water through percolation, if it does not flow quickly down the slope. Vetiver hedgerows slow down the runoff water and allows water to percolate downward to replenish the ground water in the aquifer.

Checkdam:

Webster's: (none)

www.dictionary.com's: (none)

Vetiverim's: A small dam made of any kind of material such as bamboo poles, stone, concrete or soil to raise the level of water in the stream

Explanation: There are two types of checkdams. One retards stream flow and allows water to seep into the soil and increase soil humidity in the area. The other is the sediment control checkdams that traps water-borne debris and soil particles carried with the water. Both checkdams increase and retain moisture, and create a hydrological cycle beneficial for effective forest conservation and rehabilitation. Vetiver can be planted in front of the checkdam to stabilize it as well as to help the water to have a chance to percolate downward into the soil to replenish underground water.

Flood:

Webster's: *n.* and overflowing of water on an area normally dry

www.dictionary.com's: 1. An overflowing of water onto land that is normally dry 2. An abundant flow or out pouring

Vetiverim's: water that overflows on an area normally dry

Explanation: As a result of heavy downpour of rain, runoff water on the higher area moves downward to the lower area resulting in the flood if this amount cannot overflow to other area. Too long-standing and too fast-running floods are disasters. Vetiver can reduce such disasters.

Floodplain:

Webster's: *n.* a plain along a river, formed from sediment deposited by floods

www.dictionary.com's: a plain bordering a river and subject to flooding

Vetiverim's: *n.* a plain along a river and subject to flooding during the wet season

Explanation: Although not classified as a hydrophyte, vetiver can survive in the water, as indicated by its specific epithet, *zizanioides*, which means 'by the riverside', reflecting the fact that the plant is commonly found along waterways and floodplains. In fact, many experiments have been conducted using vetiver to treat wastewater in constructed wetland, having the situation similar to the floodplain.

Gully:

Webster's: *n.* a channel or hollow worn by running water; small, narrow ravine

www.dictionary.com's: a deep ditch or channel cut in the earth by running water after a prolonged downpour; a channel or hollow worn in the earth by a current of water; a deep ditch cut by running water esp. after a prolonged downpour

Vetiverim's: *n.* a channel or hollow worn by a current of water

Explanation: It has been demonstrated that vetiver can help reduce the occurrence of gully, to minimize its extent, and to stabilize and even to rehabilitate the gully.

Landslide:

Webster's: *n.* the sliding of a mass of loosened rocks or earth down a hillside or slope

www.dictionary.com's: the downward sliding of a relatively dry mass of earth and rock; the slopping down of a mass of land from a mountain, hill, etc.

Vetiverim's: *n.* the sliding of a mass of earth and rock downhill

Explanation: Landslides are often caused by the lack of structural strength of the ground on steep slopes and the event is triggered by saturation during heavy rainfall periods. Under natural condition,

deep-rooted trees in the forest provide structural reinforcement, but when deforestation occurs, this structural protection is lost and landslide often results.

Mudslide:

Webster's: *n.* a slow, viscous mudflow down a gradual slope

www.dictionary.com's: a mudflow, esp. a slow moving one

Vetiverim's: *n.* the sliding of mud down a hillside or slope causing damage to humans and their property

Explanation: Mudslides are similar to landslides, except that the soil turns into mud when it is soaked with water for a prolonged period of time. The effect of mudslide can be worse than landslide since mud could bury everything including humans.

Standing Shallow Water:

Webster's: (none)

www.dictionary.com's: (none)

Vetiverim's: Shallow Water that is maintained in a basin the whole, or about the whole year.

Explanation: This is the case of swamps, wetlands, bogs, marshes, etc. Where standing shallow water is maintained the whole year, or almost the whole year. As vetiver can survive well in water and , together with its high rate of water consumption and tolerance to a high degree of water contamination, it is ideal to be used to solve the problem of such a situation.

Too Much Water:

Webster's: (none)

www.dictionary.com's: (none)

Vetiverim's: A phrase to describe the conditon where a large amount of water is present

Explanation: Too much water may occur in nomal or abnormal situations. Normal situation is the case where too much water is present as standing shallow water or water-saturated topsoil. Abnormal situation is the case when too much water is present as the result of heavy downpour of the rains, which may also end up with several kinds of disasters such as landslides, mudslides, destructive fast-flowing currents, and floods.

Water-saturated Topsoil:

Webster's: (none)

www.dictionary.com's: (none)

Vetiverim's: Shallow topsoil having hardpan layer underneath it and periodically saturated with water, especially in the rainy season.

Explanation: This condition results in water saturation of the topsoil during the rainy season. As a result, plant growth is retarded. If vetiver is planted in such a soil, the hardpan layer is penetrated by vetiver roots that allow water to seep through to subsoil layer. In this way, excess water is drained downward in the wet season while water rises up through capillary force during the dry season. This helps the growth of crops growing in such a soil.

Wetland:

Webster's: *n.* **1** swamps or marshes. **2** an area of land characterized by swamps, marshes, etc. this is preserved for wildlife

www.dictionary.com's: a lowland area, such as a marsh or swamp, that is saturated with moisture, esp. when regarded as the natural habitat of wildlife; a low area where the land is saturated with water

Vetiverim's: *n.* a lowland area saturated with water

Explanation: Wetlands, either natural or constructed, can be used for water purification in the process of phytoremediation. Vetiver has been used as a means to remove heavy metals, toxic substances, pesticide residues, chemical elements, and other hazardous materials present in contaminated water.

The Visit of HRH Princess Maha Chakri Sirindhorn of Thailand to Guangzhou*

At the invitation of the Organizing Committee of ICV-3, Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand, the Patron of The Vetiver Network, gave a special visit to the Guangdong Academy of Agricultural Sciences (GAAS) on 23 October 2002.

The ICV-3 Organizing Committee also invited some leaders and officers from Guangdong Provincial Department of Science and Technology, Guangzhou Branch of Chinese Academy of Sciences, South China Institute of Botany of the Chinese Academy of Sciences, South China Agricultural University, as well as GAAS, to welcome HRH. Accompanied by the Consulate-General of the Royal Thai Consulate in Guangzhou and officers of the Guangdong Provincial Foreign Affairs Office, HRH graciously arrived at GAAS at 10:40 a.m. Prof. Luo Fuhe, the President of the Organizing Committee first gave a warmest welcome to HRH's visit, and then introduced the leaders and officers, one by one, to HRH. Thereafter, Prof. Luo and his colleagues accompanied HRH to visit various units of GAAS.

* *By Hanping Xia, South China Institute of Botany, Chinese Academy of Science*

Photo caption of HRH Princess Maha Chakri's visit to Guangzhou (on the right page)

1st row: Vetiver posters prepared especially for HRH Princess Maha Chakri Sirindhorn's visit. The Chinese VIPs ready to welcome HRH's arrival.

2nd row: Prof. Luo Fuhe, President of the ICV-3 Organizing Committee, accompanied HRH to visit vetiver exhibit. Dr. Xia Hanping, Vice Chairman of ICV-3, introduces the Vetiver System in Guangdong to HRH.

3rd row: Mr. Hong Hao, Secretary General of the ICV-3 describes the role of the private sector in China. HRH observes vetiver growing on bamboo floats to absorb N and P from wastewater in the pond.

4th row: Prof. Luo Fuhe reports on the progress of ICV-3 and invites HRH to be a Chairperson of ICV-3. HRH gives an inscription in Chinese character (*Zhong Xiang Gen Cao Hao*), meaning 'good to plant vetiver'.

Firstly, HRH came to the poster corridor, in which Dr. Xia Hanping, Vice Chairman of the ICV-3 Organizing Committee, presented a detailed introduction about the history of development of vetiver in Guangdong and the progress on vetiver scientific research conducted in Guangdong. Then, Mr. Hong Hao, the Secretary-General of the ICV-3 Organizing Committee and the President of the Hongri Group, a private vetiver consulting company, gave an introduction about the role of the Chinese private sector in dissemination the Vetiver System. Then Mr. Luo Xiaoliang, and associate professor of the South China Agricultural University presented the situation of the VS's applications in agriculture and other aspects in Guangdong.

After that, HRH visited the pond where vetiver was grown on floating bamboo platforms. Its description, including the time of planting, function, and characteristics of vetiver in water, was presented by the Officer in Charge. HRH seriously wrote down what she saw and heard, from the beginning to the end. After that HRH was led to the meeting room where she was welcomed by an elegant vetiver 'ikebana'. HRH gave a high compliment to its artistic value and aesthetic feature. Subsequently, HRH listened to Prof. Luo's report on the progress of the preparation of ICV-3. On behalf of the ICV-3 Organizing Committee, Prof. Luo expressed his subliminal respect to HRH for her persistent support to the vetiver undertaking and her great concern for ICV-3. At the same time he humbly invited HRH to graciously present herself at the ICV-3 as one of Conference's Chairpersons, and to deliver the Inaugural Address as well as to confer the awards to the awardees of the King of Thailand Vetiver Awards at the Opening Ceremony. HRH gladly accepted Prof. Luo's invitation. She also expressed her satisfaction with the preparation for ICV-3, and at the same time she gave a laud to the development of US in China, especially in Guangdong. HRH also gave a penetrating analysis to the advantages and the disadvantages

in Thailand and China with reference to the dissemination and the application of the VS. She said that the Thai Government attached importance to vetiver, and the Thai scientists did a lot of good research work on this plant, but the Thai private sector was not as active as the Chinese one. Therefore, she ardently hopes that vetiver workers in Thailand and China strengthened the exchange and cooperation to promote the VS development in the two traditionally friendly nations.

After the meeting was over, HRH and Prof. Luo presented gifts to each other. In the end, HRH graciously inscribed “Good to plant vetive – Sirindhorn” in Chinese (*Zhong Xiang Gen Cao Hao – Shi Ling Tong*) in the visitors’ book, and then confirmedly said to everybody “see you next year”, also in Chinese (*Ming Nian Jian*)! All the Chinese nationals on the spot were very amazed at HRH’s wonderful Chinese handwriting and fluent Chinese tongue!

Nearly at noon, the most distinguished HRH left GAAS. Everyone was very reluctant to part from her, and saw her off until she disappeared.

Studies on the Benefits of Constructed Wetlands for Oil-refined Wastewater Purification*

Four herbaceous plants, *Vetiveria zizanioides*, *Phragmites australis*, *Typha latifolia*, and *Lepironia articulata*, were planted in simulated constructed wetlands for the purposes of testing their efficiencies in the purification of oil-refined wastewater and their growing performances in oil-refined wastewater wetland. The experiment was conducted using three kinds of water, namely, (i) clean water (CW), (ii) low-concentration discharge wastewater (LCDW), and (iii) high-concentration flotation wastewater (HCFW). After the plants grew in clean-water wetlands for two months, three successive batches of wastewater were loaded and each batch was detained in wetland for eight days; after that the samples were collected and analyzed. The following results were obtained after four months:

1. The content of pollutants in oil-refined wastewater was quite high, especially Treatment 2 – HCFW whose pollutants tested in the trial exceeded the 2nd Standard of Discharge of Sewage (SDS-2) stipulated by the Chinese Government. For example, COD>130 mg/L, and Oil>36 mg/L. Therefore, the HCFW could not be directly discharged but should be further treated. The tested indices of LCDW that came from HCFW through physical and chemical purification, have almost all met SDS-2. The purifying rates of constructed wetlands for oil-refined wastewater, In the first batch of HCFW, 97.7% of ammoniac N, 78.2% of COD, 91.4% of BOD, and 95.3% of oil were removed. In the first batch of LCDW, 97.1% of ammoniac N, 71.5% of COD, 73.7% of BOD, and 89.8% of oil, were removed. But the

* By Hanping Xia, South China Institute of Botany, Chinese Academy of Sciences. The project is supported jointly by The Donner Foundation through The Vetiver Network, Maoming Perto-chemical Co., and China Petro-Chemical Corp.

performance of wetlands became a little poorer as time passed. For example, in the third batch of HCFW, 97.3% of ammoniac N, 64.3% of COD, 92.6% of BOD, and 96.0% of oil were removed; similarly, in the third batch of LCDW only 98.3% of ammoniac N, 39.6% of COD, 68.6% of BOD, and 71.1% of oil were removed. During the period of wastewater purification, the purifying rates of wetlands to ammoniac N, COD, BOD, and oil were rated as: ammoniac N > oil > BOD > COD. The main reasons that purifying efficiency of plants to ammoniac N was high were due to its extremely high volatility and the easy transformation feature into nitrate N or N₂. All in all, the effectiveness of wetlands for wastewater purification was not so stable.

2. At the beginning, the purifying function of plants was quite weak. The purifying rates of some wetlands with plants were even lower than those without plants. As time passed, however, the function of plants gradually increased with acceleration of growth and increase of biomass. But there was only a little disparity among purifying abilities of different species, and they were not significantly different. All four species tested had better growth in wetlands with two wastewater than those in clean water, indicating that their resistance to pollution was strong. However, the tillering numbers of *V. zizanioides*, *P. australis*, and *T. latifolia* in HCFW were fewer than those in LCDW, but *L. articulata* was on the contrary, inferring that HCFW might damage the other three species, and promote the growth of *L. articulata*. This phenomenon was perhaps related to the original habitat of *L. articulata* that was a natural effluent wetland of oil-shale waste dump in Maoming, which was very similar to the habitat condition of the experiment. *V. zizanioides*, *P. australis*, and *T. latifolia*, on the other hand, were collected from the nursery having different growing conditions.

3. During the period of growth in clean water, the new tiller-producing rate of *V. zizanioides* was the lowest among the four species tested. This was probably associated with their original habitats, as *V. zizanioides* was sampled from the xeric environment while other three species were from the hydrophytic one similar to the condition of the experiment. During the phase of cultivation in wastewater, the rate of tiller formation of *V. zizanioides* gradually rose, while that of the other three species was distinctly lowered, indicating that *V. zizanioides* possesses stronger tiller-producing ability than the other three species after it has acclimatized itself to the hydrophytic environment. It can be concluded that *V. zizanioides* may have a stronger adaptation to the environment than other species tested in the experiment.

His Majesty the King of Thailand's New Initiatives on Vetiver

On 16 November 2002, while paying a royal visit to plant trees for the Sustainable Reforestation Project in honor of His Majesty the King, which was organized by the Petroleum Authority of Thailand at

Pran Buri District, Prachuap Khiri Khan Province, His Majesty graciously granted initiatives concerning growing of vetiver as follow:

➤ *“Vetiver should be planted, either before or together with forest, particularly in the slope areas.”*

According to His Majesty’s idea, vetiver has to be planted properly, that is, across the contour. In the map provided by the Petroleum Authority of Thailand, there are green traces of forest growing like those of cabbage cultivation conducted by the hilltribe people. His Majesty then asked the officials to look at the stream down the hill where soil heave upon the land.

➤ *“Vetiver should be planted in rows to protect against forest fires in the forest growing areas.”*

Normally reforestation activity requires care from fire extinguishers as well as the use of motorcycles for the survey. It is better to grow vetiver as hedgerows because vetiver is different from cogon grass. In the dry season, cogon grass is easily burned whereas vetiver is still green and fresh since it has a long root system to help absorb moisture from the soil. Consequently, vetiver naturally helps protect against forest fire.

On another occasion, on 22 November 2002, His Majesty the King granted initiatives regarding vetiver growing to the Board of the National Research Council of Thailand, at Klai Kang Won Palace, Hua Hin District, Prachuap Khiri Khan Province, as Follow:

➤ *“Vetiver should be planted, either before or together with planting the forest, particularly in the slope areas. Besides, vetiver should be grown to hold soil and farms rows to prevent forest fires.”* His Majesty emphasized planting vetiver along with the forest so that vetiver could hold soil.

➤ *“The use of vetiver grass to protect against or resist termites may create both the pros and cons, because certain kinds of termites decay the wood to become useful nutrients, thus increasing soil fertility”.*

There are many species of termites, and the research finding reveals that there is no termite in the plot where cogon grass and vetiver are grown.

➤ *“The use of vetiver to prevent rats and snakes ought to be highlighted.”* Vetiver can prevent rats and snakes from coming into the area if it is grown in tight hedgerows. However, one should be cautious about a balance of nature because these two creatures are enemies. If no snakes are present, the number of rats will increase. But, if there are too many snakes, they may be dangerous to people.

The Fourth Thai National Conference on Vetiver

Office of the Royal Development Projects Board of Thailand organized “The Fourth Thai National Conference on Vetiver” between 28-29 November 2002 in Bangkok. The conference was aimed at presenting the results of the implementation of vetiver works undertaken by various governmental agencies as well as presenting the problems and obstacles encountered for the dissemination of vetiver to

the farmers and other users. Another objective of the conference was to prepare the vetiver scientists as well as practitioners for the Third International Conference on Vetiver (ICV-3) to be held in Guangzhou, China in October 2003.

The Conference attracted 400 participants from 48 agencies, mostly from the government side. It provided a good forum to exchange views and experiences among vetiver practitioners around the country. The Conference started with the Keynote Address by the Privy Councilor, Mr. Ampol Senanarong. Then Dr. Sumet Tantivejkul, the Secretary-General of Chaipattana Foundation gave a special lecture on, “Ten Years of Operation, Experience, Problems, Obstacles, and Future Directions of Vetiver Implementation”. The plenary Lecture was given by Mr. Panthep Klanarongran, the Secretary-General of the Office of the Royal Development Projects Board on the topic, “The Future Plan for Vetiver Works according to the Third Vetiver Development Master Plan”. The rest of the Conference comprised of four panel discussions, namely “Vetiver and Water”, “Dissemination and Promotion : Obstacles, and Prospects for More Efficiency”, “The Role of Thailand in Promoting the Use of Vetiver in Foreign Countries”, and “How to Make Vetiver an Income-Generating Crop for Industry”. Additionally, there were three Group discussions on, “The Role of the Private Sector in Promoting Vetiver in Thailand”, “How to Transform Vetiver Research into Practice”, and “Problems and Obstacles in Vetiver Dissemination: the Practical Solutions”.

The Conference was rated as successful. Participants learned the importance of the private sector in the promotion and dissemination of Vetiver. A number of solutions to solve the dissemination problems were proposed. Participants learned more about a wide range of vetiver uses and utilization in addition to the conservation of soil and water. In order to make the Conference most fruitful, various documents in the forms of papers, books, CDs were distributed to all participants. Among these was the ICV-3 Second Announcement. The proceedings of the conference will soon follow and will be distributed to all participants.

Prominent NR&M Soil Conservationist Calls It a Day*

Paul Truong, one of Queensland’s most prominent soil conservationists, has taken an early retirement from the Department of Natural Resources and Mines (NR&M) following a distinguished 26-year career. Born in Vietnam, Dr. Truong studied Agricultural Science at the University of Queensland.

* ‘A ‘Media Release’ from the Queensland Department of Natural Resources and Mines, Australia – July 2002

After completing his Ph.D. in 1968, he first went home, but returned to Australia following the fall of Saigon six years later.

In 1976, Dr. Truong joined the Department of Primary Industry's (DPI) Soil Conservation Research Branch, investigating the use of vegetation for erosion control on cropping and grazing lands. He was one of the leading lights of the DPI's eight-year study (1982-90) into the use of sugarcane trash for erosion control, which led to what is now commonly known as the green cane trash blanket. The study met with widespread skepticism in an industry bound by tradition. The disbelievers claimed the retention of trash would be ineffective and impractical.

Working on the principle that groundcover would reduce soil erosion, Dr. Truong and his colleagues eventually proved that harvesting the cane in its unburnt state – instead of burning it before and after harvest, then tilling the soil clean – and leaving the trash behind made better sense. “The first step was to prove how effective the practice was in terms of the reduction of soil loss and the next step was to develop management practices that were practical and acceptable to cane growers”, Dr. Truong said.

The project demonstrated that trash blanketing not only reduced erosion, but also controlled weeds, improved soil moisture retention and increased the amount of organic matter in the soil. Its cost-benefits were borne out by subsequent economic studies. The majority of Queensland's cane farmers have since adopted trash blanketing, particularly in areas where wet weather can hamper operations and where burning – because the burnt cane must be harvested within a week to avoid spoiling – is inherently risky.

Despite his significant role in the development of the trash blanket, however, Dr. Truong will be best remembered for his work with vetiver grass, the massive root system of which has been likened to a ‘living nail’.

After hearing of the remarkable results this ‘miracle grass’ was having in a World Bank – funded erosion-control project in India, Dr. Truong searched for and found a specimen in the Mount Coot-tha Botanical Gardens in Brisbane. He subsequently proven that this vetiver variety is sterile and it was registered in Queensland as ‘Monto Vetiver’. It signaled the beginning of Dr. Truong's research into the wider benefits of vetiver, which Queensland herbarium records show, was first introduced to the state over 70 years ago.

Although Vetiver was already being used overseas to stabilize landforms and control on-farm erosion, Dr. Truong was the first person to discover its potential for mine rehabilitation and wastewater treatment. Vetiver, he found, has a high tolerance to a wide array of toxic substances, including arsenic, cadmium and sulphur. It is now being used throughout Australia to stabilize and rehabilitate waste rock heaps and tailings deposits on bauxite, coal and gold mines. In Queensland, though, it is most commonly

used to stabilize road, railway and dam batters. Dr. Troung also recognized vetiver's ability to improve water quality by, for example, absorbing large amounts of contaminants like nitrogen and phosphorous found in wastewater from abattoirs, food processing plants, sewerage schemes and the like.

Dr. Truong has won several World Bank awards. However, his crowning glory came in 2000 when he was presented with the King of Thailand Vetiver Award for his research into the global impact of the grass on the environment.

Note from the Editor

Although Paul has retired from the Queensland Public Service, he has not retired from the vetiver program in Australia and overseas. In fact it was a big gain for the vetiver cause as he now can spend full time on vetiver research and consultancy.

Since leaving NR&M Paul has continued to carry out several research projects funded by the Wallace Genetic Foundation under the theme of Vetiver and Water, concentrating on Wastewater Treatment, Water Quality Improvement on Acid Sulfate Soil and Riverbank Stabilisation. He has also continued to supervise the Riverbank Erosion Control in the Mekong Delta and Erosion Control in Rubber and Cocoa Plantation in Vietnam, Oil Refinery Wastewater Treatment and Acid Mine Leachate from Guangdong, China. The Donner Foundation funds these projects.

Although flume testing at the University of Southern Queensland has been completed, there have been very limited results from field tests due to the worst drought in the last 100 years. On the other hand a wealth of new information has been obtained from the Wastewater Treatment program including a computer model for effluent disposal by land irrigation. The results from the Acid Sulfate Soil program are also excellent and have received a lot of attention at the last International Acid Sulfate Soil Conference in Australia.

The results of his works will be presented at ICV-3 in Guangzhou, China, in 6-9 October this year.

In his 'spare time' Paul has set up VETICON CONSULTING to provide consultancy service to various companies and government agencies in Australia on the use of vetiver for wastewater treatment and erosion control. His current major works include wastewater treatment for an abattoir, a food processing plant, a landfill leachate disposal, a sewage effluent disposal and highway and railway stabilization. He is also active in international projects, including a major highway stabilization and coastal dune stabilization in Vietnam, and will probably start new projects in Senegal, Indonesia, and Laos this year.

ABC Broadcast News on Vetiver

Vetiver has recently received some good endorsements from the Australian Broadcasting Commission (ABC). The ABC in both its rural affairs and general news has mentioned vetiver quite often in the last few months for its drought tolerance and erosion control ability when the drought breaks. But on Sunday 12 January 2003 it was further highlighted in a major interview by ABC Radio State Wide Program. Dr. Rob Loch from the National Centre for Engineering in Agriculture (NCEA) at the University of Southern Queensland, Toowoomba (where Paul Truong is working with Professor Rod Smith on waste management and riverbank stabilization) discussed the merits of the vetiver system for both erosion and sediment control, and environmental protection. In the broadcast the reporter said on searching the Internet for vetiver information he was surprised to find 8,500 references listed, including one major support statement from the King of Thailand.

Another Technical Bulletin Published by PRVN

The Pacific Rim Vetiver Network (PRVN) has recently published another technical bulletin, titled, "The Use of Vetiver for Soil Erosion Prevention in Cassava Fields in Thailand" as the second bulletin for 2002. It was written by Somsak Suriyo and Wilawan Vongkasem of the Rice and Field Crop Promotion Division, Department of Agricultural Extension. This 16-page bulletin, including 8 color pages, was edited by Dr. Narong Chomchalow and Dr. Samran Sombatpanit. It deals with the use of vetiver hedgerow planting to help reduce soil erosion in the cassava fields, the method the farmers themselves were experimenting with, and, after realizing its performance, the farmers accept the practice for trial in their own fields. The result from seven years of investigation has a great impact on the farmers' awareness of the importance of soil erosion prevention. They adopted the technique of vetiver hedgerows across the slopes in the cassava fields in 18 villages located in eight provinces. Altogether, 622 farmers participated in planting 111 km-long vetiver strips in their cassava fields, employing a total of 1,257,600 vetiver slips.

Copies of this bulletin have been sent to key personnel of the vetiver networks around the world. For those who want to have a copy, please write to the International Affairs Section of the Office of the Royal Development Projects Board.

Letters to the Editor

Constructed Wetlands

We are conducting the project, "A Study on Purification of Vetiver Man-made Wetland for Industrial Wastewater" under the auspices of The Vetiver Network. According to the original plan, the

project is divided into two phases, the first is the experiment to find out the best species for purification of industrial wastewater, and the second is to set up a demonstration project with the screened species. We have now finished the first stage of the experiment. Attached please find its summary and some pictures. We will certainly finish the second phase of work, namely, "Establishing a high-quality demonstration site for the Third International Conference on Vetiver". We are confident that the demonstration site will be capable of becoming a highlight at the ICV-3.

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Thanks for your sending us your report. It is being published in this issue of Vetiverim. We are glad that a high-quality demonstration site has been established and, I am sure, it will be a highlight at the ICV-3 as you anticipated. Congratulation! – Ed.

Vetiver and Banana Growing

This is not great stuff, but it is meant to improve the visibility of vetiver usage in Senegal on the site. This is from a major banana growing area where the bridge was washed away every year, preventing several 1,000 tons of bananas from reaching the markets. This year, with the planting of several 100 vetiver plants, the bridge showed no signs of giving in, and trucks flowed through with ease. Banana growers have been installing vetiver hedges to reduce erosion, retain humidity in the soil, and use it for mulch. Yield increase is flagrant and comes earlier than plantations that do not use vetiver. Much of the information transfer was done by using pictures from the Office of the Royal Development Projects Board, "Vetiver and the Environment". The Gouloumbou banana picture shows the banana bunch already hanging, while trees in another section next to this one had not yet flowered.

Criss Juliard, DynaEnterprise, Senegal

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Thanks for sharing us the information and photos on using vetiver to stabilize the bridge as well as reducing erosion, retaining humidity in the soil, and using it as mulch. – Ed.

The Visit of HRH Princess Maha Chakri Sirindhorn in Guangzhou

Many thanks for your terrific report of the visit of HRH to Guangzhou. Her on-going support of vetiver has provided a worldwide surety in advancing acceptance of this beneficial technology. I also have no doubt that time spent with vetiver must be one of the most enjoyable activities on her busy

schedule! In this vein, we are all grateful for the technical and professional support you have provided in this endeavor.

Mark Dafforn, National Academy of Science, Washington, DC, USA

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*Nothing pleases me more than viewing the photographs and reading the report provided to us by Dr. Hanping Xia of HRH's visit to Guangzhou. In stead of keeping them among us, I decided to have them printed in this issue of Vetiverim for our readers to view the event. – **Ed.***