

VETIVERIM

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Editorial

What did we achieve at ICV-3?

The Third International Conference on Vetiver (ICV-3) was held in Guangzhou, Guangdong, People's Republic of China, the country that has achieved a lot in terms of knowledge and experience gained from vetiver research and development during the past decade.

The theme of ICV-3, "Vetiver and Water: An Eco-Technology for Water Quality Improvement, Land Stabilization, and Environmental Enhancement", is most appropriate at the present time when there are increasing international undertakings on conservation and control of global water resources. As has been shown in a number of experiments, both the quantity and quality of water can be improved through the use of the Vetiver System (VS). At least two other international conferences having water as the main theme were also held last year; these were the "International Year of Freshwater" and the "Third World Water Forum", both of which were held in Japan in March 2003.

As the host of ICV-3, China has shown the rest of the world her achievements in vetiver R&D, as well as its problems with respect to water resources. China is, in fact, a country that needs the VS more than most others, simply because it is the largest country in the world in terms of population and the second largest in terms of size, with enormous problems of too much or too little water as well as of wastewater treatment, water pollution, and eutrophication of the water.

At ICV-3, a number of vetiver experts presented their findings related to the vetiver's role in the environmental enhancement, particularly the improvement of water quality, the control of water quantity, the mitigation of water-related pollution, etc. However, ICV-3 also featured a wide range of the VS applications in other aspects. Of great significance derived from the study tour is to appreciate the role of the private sector in extending the vetiver eco-technology, the measures for wastewater treatment, and the application of vetiver in garbage landfill management, slope stabilization, afforestation, and rehabilitation of an ecological park. Above all, the most impressive achievement derived from attending ICV-3 was the chance to meet and share our views with all vetiverites, who have dedicated themselves to this humble grass possessing invaluable benefits to mankind.

Summary Report of ICV-3

The Third International Conference on Vetiver (ICV-3) was held at Guangdong Hotel, in Guangzhou, Guangdong Province, China on 6-9 October 2003, on the theme: “Vetiver and Water”, with the sub-theme, “An Eco-Technology for Water Quality Improvement, Land Stabilization, and Environmental Enhancement”. It was organized by the Guangdong Academy of Agricultural Sciences, South China Institute of Botany, South China Agricultural University, and Guangdong Association of Grass Industry and Environment. The co-organizers included Guangzhou Science and Technology Association, Guangdong Provincial Department of Science and Technology, Guangdong Provincial Association of Science and Technology, Guangzhou Branch of the Chinese Academy of Sciences, China Vetiver Network, Pacific Rim Vetiver Network, Food and Agriculture Organization, and World Association of Soil and Water Conservation.

There were about 250 participants from 28 countries, one-third of which were international vetiverites. The Conference was inaugurated by the Patron of The Vetiver Network – Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand, who also presented the King of Thailand Vetiver Awards (4), and first prizes of The Vetiver Network Awards (11). The program included 1 keynote address, 8 plenary lectures (with 5 case study papers), 4 award-winning papers of the King of Thailand Vetiver Awards, 42 contributed oral papers, about 25 scientific poster papers, the exhibition of posters and demonstration stalls, and a one-day study tour. Welcome and farewell dinner receptions were also arranged.

The topics of the keynote address, plenary lectures, the King of Thailand Vetiver Awards winning papers, are presented below:

Keynote Address: “Thailand’s Experience with Respect to Vetiver and Water” by Dr. Sumet Tantivejkul, Secretary-General, Chaipattana Foundation, Bangkok, Thailand.

Plenary Lectures:

Session I: Vetiver Grass: A World Technology and Its Impact on Water by Richard G. Grimshaw, Chairman, The Vetiver Network (USA).

Session II: Vetiver System for Water Quality Improvement. The session paper, “Clean Water Shortage, an Imminent Global Crisis – How Vetiver System can Reduce Its Impact” by Paul Truong, Veticon Consulting, Brisbane, Australia, with a case study paper, “Vetiver System for Industrial Wastewater Treatment in Queensland, Australia” by Cameron Smeal¹, Margo Hackett², and Paul Truong³. ¹GELITA Australia, Queensland, Australia; ²Teys Bros., Queensland, Australia; ³Veticon Consulting, Brisbane, Australia.

Session III: Vetiver System for Agricultural Development. The session paper, “Vetiver System for Agricultural Production” by Liyu Xu¹, Shengluan Lu², and Paul Truong³. ¹Coordinator, China Vetiver Network, Nanjing, China; ²Red Soil Research Institute of Jiangxi Province, Jinxian, China; ³Veticon Consulting, Brisbane, Australia.

Session IV: Vetiver System for Slope Stabilization by Diti Hengchaovanich of the APT Consult Co. Ltd., Bangkok, Thailand.

Session V: Vetiver System for Land Reclamation. The session paper, “Application of Vetiver System in the Reclamation of Degraded Land” by Hanping Xia¹ and Wensheng Shu²; with a case study paper, “Integrated Vetiver Technique for Remediation of Heavy Metal Contamination: Potential and Practice” by Wensheng Shu² and Hanping Xia¹. ¹South China Institute of Botany, Guangzhou, China; ²Zhongshan University, Guangzhou, China.

Session VI: Vetiver System and Private Sector. The session paper, “Accelerating Vetiver System Dissemination Through Private Entrepreneurs” by Criss Juliard, DynaEnterprise, Dakar, Senegal, with a case study paper, “Vetiver Technology – System Innovation and Their Application” by Hong Hao^{1,2} and Quan Wenzhi². ¹Guangdong Association of Grass and Environment, Guangzhou, China; ²Hongri Group, Beijing, China.

Session VII: Vetiver’s Other Applications. The session paper, “Other Uses, and Utilization of Vetiver” by Narong Chomchalow¹ and Keith Chapman². ¹Coordinator, Pacific Rim Vetiver Network, Bangkok, Thailand. ²FAO Regional Office for Asia and the Pacific, Bangkok, Thailand; with two case study

papers: “Vetiver Oil” by U.C. Lavania, Central Institute of Medicinal and Aromatic Plants, Lucknow, India, and “Utilization of Vetiver Grass as Construction Materials” by Pichai Nimityongskul, Asian Institute of Technology, Pathum Thani, Thailand.

Session VIII: Advance of Scientific Research on Vetiver System. The session paper, “Vetiver Grass, A Little Recent History and Thoughts for the Future” by John Greenfield, TVN Board Director, New Zealand.

Presentation of the Winning Papers of the King of Thailand Vetiver Awards

Dissemination/Government Agency: “The Use of Vetiver for Soil Erosion Prevention in Cassava Fields in Thailand” by Wilawan Vongkasem¹, Kaival Klakhaeng¹, Watana Watananonta², and Reinhardt H. Howeler³. ¹Department of Agricultural Extension, Bangkok, Thailand; ²Department of Agriculture, Bangkok, Thailand; ³CIAT Regional Cassava Program for Asia, DOA, Bangkok, Thailand.

Dissemination/Non-Government Agency: “Vetiver Victorious: The Systematic Use of Vetiver to Save Madagascar’s FCE Railway” by Diti Hengchaovanich¹ and Karen Schoonmaker Freudenberger². ¹APT Consult Co. Ltd., Bangkok, Thailand; ²Fianarantosa Cote Est Rehabilitation Project, Fianarantosa, Madagascar.

Research/Agricultural Application: “Vetiver Research for Agricultural Production on Red Soils” by Shengluan Lu, Red Soil Research Institute of Jiangxi Province, Jinxian, Jiangxi Province, China.

Research/Non-Agricultural Application: “Ecological Effectiveness of Vetiver Constructed Wetlands in Treating Oil-refined Wastewater” by Xia Hanping¹, Honghua Ke², Zhaoping Deng², Peng Tan², and Shizhong Liu¹. ¹South China Institute of Botany, Guangzhou, Guangdong, China; ²SINOPEC Maoming Refining & Chemical Co., Ltd., Maoming, Guangdong, China.

Concurrent Sessions: The topics of the four concurrent sessions, with the number of papers in brackets, are given below:

Session I: Erosion and Flood Control, and Slope Stabilization (11 papers)

Session II: Agricultural Development (11 papers)

Session III: Wastewater Purification and Pollution Mitigation (12 papers)

Session IV: Basic Scientific Research and Other Aspects (12 papers).

Business Meeting: A Business Meeting was held to: (i) amend ICV Constitution, (ii) nominate the host and venue of ICV-4, and (iii) nominate the Continuing Committee for ICV-4. Detail of the Business Meeting is presented in separate article (below).

Special Plenary Sessions: On the final day of the Conference, two separate plenary discussions were held. One was on “Vetiver System: Watershed Planning for Clean and Reliable Water Supplies”, led by Richard Grimshaw and Jim Smyle. The second was on “Vetiver Enterprises” in which six successful consulting firms presented their brief accounts; these were: (i) Guangzhou Hongri Landscape Architect Co. Ltd., by Hao Hong, (ii) Guangzhou EcoEnvironment Science and Technology Co. Ltd., by Ping Zhang, (iii) Guangdong Eco Environmental Science and Technology Co. Ltd., by Julia Xu, (iv) Guangzhou Rivers Enterprise Co. Ltd., by Binhua Zeng, and (v) Guangzhou Vetiver Grass Environmental Science and Technology Co. Ltd., by Ziyuan Feng.

Closing Ceremony: Three speakers were invited to give their talks at this Closing Ceremony.

Concluding Remarks: Narong Chomchalow, Coordinator, Pacific Rim Vetiver Network, and Vice Chairman of the Scientific Committee of ICV-3, presented an overview of the role of vetiver on water quantity and quality.

Future Perspective: Dale Rachmeler, Coordinator, The Vetiver Network, gave his view on future perspective.

Closing Address: Dick Grimshaw, Chairman, The Vetiver Network, delivered his closing remarks.

Study Tour: A one-day study tour was organized on 8 October for an on-site live demonstration of VS projects ranging from applications of vetiver in garbage landfill site management, land slope

stabilization and afforestation, and water and vegetation rehabilitation at an ecological park. The participants have witnessed some amazing achievements by private contractors in stabilizing huge quarry slopes, deep excavations, and the contoured exterior of a massive waste dump.

Social Events: Three social events took place during ICV-3. One was the Welcome Dinner Reception on 5 October, held at Guangdong Hotel. The second one was on 6 October when all participants enjoyed the Pearl River Night Cruise with superb food and nice view along the Pearl River at night. The last one, the Farewell Dinner, was held at Guangdong Hotel on 8 October.

Post ICV-3 Proceedings: Paul Truong is preparing Post ICV-3 Proceedings in digital format for The Vetiver Network. This CD will include PowerPoint presentations accompanying most technical papers and photos of other activities such as study tour, social events, posters, exhibitions and other interesting activities. The CD, which is produced in Thailand, will be sent out to delegates soon.

Report of the Business Meeting of ICV-3

The Business Meeting was held on 7 October 2003, 19.30-21.00, at Pearl River Hall, Guangdong Hotel, Guangzhou, China. It was attended by 31 key participants who represented various countries attending ICV-3. Dr. Sumet Tantivejkul, Chairman of the Continuing Committee (CC) for ICV-3, chaired the meeting, while Dr. Narong Chomchalow, Secretary of CC for ICV-3, convened the meeting. Mrs. Suwana Pasiri, Director of the Planning and Foreign Affairs Division of the Office of the Royal Development Projects Board, Thailand, was the Secretary. The summary of the Business Meeting of ICV-3 is presented below:

Amendment of ICV Constitution

Only one item of the ICV Constitution was submitted for amendment, namely the duration between each conference. It was agreed that the duration between each conference should be changed from four years to three years in order to keep up with the acceleration of works in various fields of vetiver research and development.

Nomination of the Host Country of ICV-4

There were four nominees, namely: (i) the Philippines, by Ms. Noah Manarang, (ii) Venezuela, by Dr. Oswaldo Luque, (iii) China, by Ms. Wen Zhu Li, and (iv) South Africa, by Mr. Jon McCosh.

Each nominee gave a brief presentation why she/he thought her/his country should host ICV-4. However, it was difficult for the meeting to decide on which country should be given the task of hosting ICV-4. It was agreed that all nominees should go back and prepare a proposal containing necessary information which should include the sources of funding, organizational support, plan of operation, the venue and other facilities, etc. The proposal should be finalized and submitted to the Chairman of CC for ICV-4 within six months, i.e. by the end of March 2004. The CC Chairman will further circulate the proposal to other members of the CC to make final decision on the country to host ICV-4.

Proposal on the Date of ICV-4

It was agreed that ICV-4 should be held three years from the end of ICV-3, which would be around October 2006. However, the host country can fix the date up to six months before or after October 2006 in order to have the conference held at the most pleasant climate as well as the most convenient time of the host.

Theme and Sub-theme of ICV-4

It was agreed that the theme of ICV-4 would be, "Vetiver and People", as proposed by Dr. Oswaldo Luque of Venezuela. A sub-theme, "An Investment for the Future", was subsequently suggested by Dr. Paul Truong of Australia. However, the theme and sub-theme of ICV-4 may be modified by the Organizer as deemed necessary, with the approval from the CC of ICV-4.

Nomination of Members of CC for ICV-4

According to the ICV Constitution, the following 11 members have been elected:

Ex-Officio Member: (President of the immediate past ICV)

Prof. Fuhe Luo from China, President of ICV-3

Regional Representatives:

Region 1: Southeast Asia

Dr. Narong Chomchalow, Thailand
Ms. Noah Manarang, the Philippines

Region 2: East Asia, Oceania and the Pacific

Prof. Liyu Xu from China
Dr. Paul Truong, Australia

Region 3: South Asia and the Middle East

Dr. Umesh Lavania, India
Mr. M. Nazrul Islam, Bangladesh

Region 4: Europe and Africa

Mr. Anthony J. Makoye, Tanzania
Mr. James Owino, Kenya

Region 5: The Americas and the Caribbean

Dr. Dale Rachmeler, USA
Dr. Oscar Rodriguez, Venezuela

Chairman of CC for ICV-4

Dr. Sumet Tantivejkul of Thailand, the *ex-officio* member of CC/ICV, in his capacity of the President of the past two ICVs, was elected Chairman of CC for ICV-2 and ICV-3, and had served in this position for two consecutive terms. His term of office has been expired at the end of ICV-3 and cannot be re-elected as he is no longer the *ex officio* member of CC for ICV-4.

The meeting unanimously elected Dr. Narong Chomchalow of Thailand the new Chairman of CC for ICV-4.

Non-Voting Members of CC for ICV-4

In order to run the activities of CC for ICV-4 smoothly and effectively, Dr. Narong Chomchalow, Chairman-elect of CC for ICV-4 proposed to have the following persons to serve as the non-voting members of CC for ICV-4:

- Dr. Sumet Tantivejkul, former Chairman of CC for ICV-2 and ICV-3, and presently Secretary-General of the Chaipattana Foundation (Thailand), as the Advisor of CC for ICV-4
- Mrs. Suwanna Pasiri, Director of the Planning and Foreign Affairs Division of the Office of the Royal Development Projects Board (Thailand), as the Secretary of CC for ICV-4.

Opinions of Some Participants of ICV-3

The Third International Conference on Vetiver (ICV-3) held in Guangzhou, China, during 6-9 October 2003 has attracted more than 250 participants, one-third of which were from foreign countries. Details of ICV-3 have been presented on various occasions in previous issues of Vetiverim, as well as in the present one. During the past few months, the Editor has received communications from many persons who participated in ICV-3 concerning their impressions about the conference. Presented below are opinions of some of them.

President-Elect of The Vetiver Network

I would like to take this opportunity to congratulate all who participated in the Third International Conference on Vetiver held in Guangzhou. It was a spectacular event, professionally

organized and implemented with wonderful precision. Your preparations paid dividends for all the participants of which I was one. As such I would like to say that I was treated to a plethora of new information and it will take me some time to digest it all. The exhibitions were presented in an impeccable fashion and were indicative of much prior preparation.

The Organizers are to be lauded for their attention to detail and for their devotion to the cause of spreading vetiver technology around the world. It is obvious to me that we have been witness to a new era of disseminating special solutions to thorny problems plaguing mankind threatening to destroy the environment we all live in. I was especially impressed by the field trip and the work that is happening in the private sector. It is my belief that the extension of vetiver technology by the private sector will be a key element for the future.

It was my pleasure to meet everyone for the first time. As the new President elect of The Vetiver Network, I would like to take this opportunity to say that I am proud to be associated with all of you. Please do not hesitate to contact me at any moment, I am here for you.

Dale Rachmeler, President and CEO elect,
The Vetiver Network
<rachmeler@vetiver.org>

Deputy Director of the (Indian) Central Institute of Medicinal and Aromatic Plants

In general, ICV-3 was a very well organized international conference embracing environmental, scientific, societal and social considerations, meeting highest standards expected for any scientific meeting. The organizers deserve all credits for their painstaking efforts. I had the privilege of having attended the first two conferences, ICV-1 (1996) in Chiang Rai, Thailand, and ICV-2 (2000) in Cha-am, Phetchaburi, Thailand, and was highly impressed by the Thais who set high standards for ICV with enviable perfection, especially VS technology demonstration at the conference site and vetiver in action at their project sites. The two earlier ICVs were eye opener that portrayed bioengineering and eco-friendly potential of vetiver grass, and the third one in China provided means and ways for environmental enhancement, more particularly water quality improvement and mitigation of pollution.

The arrangements made by the organizers for conference deliberations and exhibition, and preparations of project sites for study tour, more particularly Datanshan garbage landfill site, will remain the path-setter, and the social events arranged are simply memorable. The conference deliberations were of high standard, and we returned with several prospective ideas. We were so enthused that immediately on our return from Guangzhou, I along with my wife, Dr. Seshu Lavania, visited some natural vetiver growing areas 50 km around our city located in north Indian plains. I was pleasantly amazed to see that natural water bodies with vetiver growing on the rim have relatively clean water compared to eutrophicated water in non-vetiver ponds which is in consonance to what was experimentally demonstrated by Paul Truong's study group. We learned a lot about the potential of Vetiver System in water quality improvement and environmental enhancement, and have prepared a comprehensive Meeting Report on ICV-3 for a reputed science journal, "Current Science", published from India in order to reach the wide readership to appraise the potential of VS system. This report is now available online, and could be viewed at www.ias.ac.in/currsci/ in 10 January 2004 issue of *Current Science* 86(1): 11-14.

All in all, it was one of the best conferences I happened to attend, and the arrangements made truly reflected Asian traditions enriched with superb hospitality. Our hearty congratulations to all associated with the organization of ICV-3.

U.C. Lavania, Deputy Director
Central Institute of Medicinal and Aromatic Plants, Lucknow 226 015, India
<Lavania@cimap.res.in>

Coordinator of the East Bali Poverty Project

Whilst the conference theme was "Vetiver and Water" focusing largely on the capability of vetiver to absorb many harmful nutrients emanating from waste of all kinds – from pig effluent to leachate from garbage landfills – the international community of vetiver experts presented work in every possible area where vetiver can aid everything from serious verge erosion to producing

handicrafts and perfumes. Papers were presented over a two-day period with concurrent morning and afternoon sessions, titled, “Erosion and Flood Control, and Slope Stabilization; Agricultural Development; Wastewater Purification and Pollution Mitigation; Basic Scientific Research and Other Aspects”, respectively.

One of the most impressive papers in my opinion was presented by J. Van den Berg from South Africa, entitled “Can Vetiver Grass be Used to Manage Insect Pests on Crops?” Johan initiated field experiments illustrating how vetiver can act as a barrier for pest control on corn crops. This is certainly an area where the East Bali Poverty Project (EBPP) would like to start experimenting, as our key pests are in fact caterpillars, seriously affecting growth of everything from potatoes to tomatoes.

The highlight of the conference for most people though was the one-day study tour on 8 October, where we witnessed some amazing achievements by private contractors in stabilizing huge quarry slopes, deep excavations, and the contoured exterior of a massive waste dump.

Probably the most valuable long-term benefit for me was seeing what others had done with vetiver round the world and getting to talk with them to both share experiences and learn some of the amazing vetiver technologies, many of which were illustrated both by research trials and verified by practical applications.

In conclusion, the visit was very valuable and gave the whole EBPP vetiver team much greater confidence to move forward in a bolder way, promoting vetiver by examples, providing a more comprehensive vetiver information, advising and supplying facility and should enable us to answer most queries, thanks to the support that has been promised to me from the international vetiver community of experts.

David Booth, Coordinator
East Bali Poverty Project
info@eastbalipovertyproject.org

Inaugural Address of ICV-3

Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand, the Patron of The Vetiver Network, inaugurated the Opening Ceremony of the Third International Conference on Vetiver: Vetiver and Water, held at Guangdong Hotel, in Guangzhou City, Guangdong, China on 6 October 2003. It was a great surprise to all participants, especially the Chinese, to hear HRH deliver the Inaugural Address in Chinese. We learned that HRH had translated the text of her address by herself. Since there was no copy of the address provided to the participants of ICV-3 during the period of the conference, although HRH also re-delivered her address in English later on, the Editor thought it might be of interest to the participants as well as the readers of Vetiverim if such an address is reproduced here, as a record of the Conference. Thus, it is presented below:

“It is my great pleasure to inaugurate and participate in the Third International Conference on Vetiver under the theme, “Vetiver and Water: An Eco-Technology for Water Quality Improvement, Land Stabilization, and Environmental Enhancement”. As vetiver is playing a key role on the quantity and quality of water, such a theme is most appropriate at present, when water has become one of the most severe problems affecting all lives, especially in the developing countries.

The last two international conferences on vetiver were held in Thailand to commemorate His Majesty the King of Thailand’s 50th Anniversary of His Accession to the Throne, and His Sixth Cycle Birthday Anniversary, because His Majesty has done a lot in the field of vetiver research and development in Thailand. It is an opportune time that the Third International Conference on Vetiver is being held here in China, the country that has progressed tremendously in research and development of the vetiver grass in the last few years. I have witnessed some of such progresses myself during my last visit to Guangzhou last October.

I hope that this Conference would provide an opportunity for vetiver workers from every country to learn from each other’s experience, and to share the ideas and knowledge among each other. This would ultimately culminate in the widespread use of the vetiver system in shaping a

better world through the reduction or elimination of soil erosion problem and mitigation of environmental degradation and disasters.

May I now declare open the Third International Conference on Vetiver. I wish this Conference a success in achieving its goal. Finally I wish all the participants a great success in all your endeavors.

Can Vetiver Grass be Used to Manage Insect Pests?

Work by J. Van den Berg of South Africa, and his colleagues (C. Midega, L.J. Wadhams, and Z.R. Khan) presented at ICV-3 shows conclusively that vetiver acts as a trap crop for stem borer.

Vetiver hedgerows significantly reduce the amount of stem borer damage to maize and other cereal crops due to the fact that stem borers lay their eggs preferably on vetiver leaves. Due to the hairs on the underside of vetiver leaves the larvae cannot burrow into the vetiver and, therefore, fall off and die. Vetiver leaves are also hosts to insect predators that over winter on the plant, that then attack other insects on the maize in the spring. Stem borer – *Chilo* spp. – is also a problem for rice and sorghum. All field staff are urged to test the effectiveness of vetiver for stem borer control on all cereal crops as soon as possible. If it is confirmed that vetiver is doing the job as an insect trap, then we have an important tool to persuade farmers to use vetiver on their fields for both soil and water conservation and insect control. Vetiver would be an IPM (Integrated Pest Management) tool with a difference! Remember also that if cut regularly, vetiver leaves provide excellent forage and also make a good mulch that is reported to control white fly.

Johnnie Van den Berg can be contacted at: Johnnie v/d Berg <johnnie@igg2.agric.za>

Wasteland Transformed into Ecotourism Hotspot*

The Peitzegou River that originates in Longchi Township in the southern part of Taiwan flows into the Erjen River after traveling 4.5 km. Its catchment area covers 330 ha of mudstone badlands, on which no vegetation can grow naturally. The barren valley covers more than 100,000 ha of badlands distributing over 19 townships in Tainan and Kaohsiung counties, accounting for 3% of Taiwan's land area. Gully and rill erosions have been observed during the rainy days, while on clear days, dried, hardened silt and gravel with a high pH level turn the valley into a desolate wasteland, sometimes causing a polluting haze.

Several attempts have been made to preserve soil by using conventional engineering methods, such as building cement escape canals, but every attempt failed. This has prompted the Council of Agriculture's Soil and Water Conservation Bureau to turn to alternative, ecologically friendly methods. A reconstruction project was launched to turn this abandoned valley into one of the leading ecological tourism spots in Taiwan. An earthen dam and embankments in the Peitzegou River's catchment area is helping to turn barren land green. The embankment has been strengthened by used tires. The technique stabilizes bare slopes and reduces soil erosion, helping plants to take root. It also offers a means of recycling old tires. An ecological engineering method involving the planting of vetiver had been successfully adopted there to prevent erosion. The Bureau's choice of vetiver, which has been used in other countries to control erosion, should be effective, because the plant can be easily grown under diverse conditions. The plant's roots can extend up to five meters, even in bad soil.

A riverside pavilion was built right on top of a vertical overflow pipe, which allows water from a reservoir to fall into an earthen dam. The pavilion was a perfect place to enjoy a fabulous view. The facilities beautifying the engineering work include bamboo shelters, pathways and ecological ponds. Integrating concepts of disaster prevention, recreation and ecological conservation, the Bureau has designated a proper route for tourists in the catchment area.

* *Extracted from the article published in Taipei Times, 10 November 2003, which also appears in the following website: www.taipeitimes.com/News/taiwan/archives/2003/11/10/2003075309.*

A preliminary ecological survey by the Council of Agriculture's Endemic Species Research Institute suggests that the valley offers a comfortable home to 13 kinds of dragonflies and some protected birds and reptiles. Officials said that Longchi has been revived by the project, turning it into a potential tourism hotspot.

Vetiver Activities in Taiwan*

There was a symposium one day before the "Eco-Technology Expo 2003" mentioned in the above news article. It was attended by about 150 erosion-control and civil-engineering professionals. Nine papers were presented to describe the "Eco-Technology" implemented in the demonstration site open to the public in the following day (reported in the Taipei Times). The author was invited to present a paper of a grant project funded three years ago to evaluate the application of vetiver in the mudstone area. It was this result that convinced the Soil and Water Conservation Bureau of the Council of Agriculture to include vetiver in their official list of recommended plant for erosion control. It has also been implemented in demonstration site of the Eco-Technology Expo 2003, where vetiver was integrated into almost every demonstrated item. The Expo was attended by 3,000 visitors. It was quite an event!

The author submitted an abstract for ICV-3, but due to the political reason and potential outbreak of the SARS, he was not able to attend. The abstract (below) has well described the areas of works the author has done in the past seven years in relation to the promotion of vetiver in Taiwan.

On 5 December 2003, the Innovation and Incubation Division of the National Taiwan University has announced the release of six new grass varieties to the public from my lab, including two vetiver varieties, namely, 'NTUS101' and 'NTUS102'. 'NTUS101' has been grown and released to public four years ago after the field evaluation finished. It has less "weedy looking" than 'Sunshine'. The root extension rate is not different from 'Sunshine'. 'NTUS102' was selected for its dense clump with better looking and shorter. The root extension rate is 2.5 cm daily compared to 3 cm of 'Sunshine' and 'NTUS101'.

In the coming month, there will be a "Vetiver Center" established in the eastern part of Taiwan, to be sponsored by a farmer's association in Hualien.

Dissemination of Vetiver Grass Technology in Taiwan*

Vetiver has been introduced into Taiwan three times in the past century. The first two introductions did not make vetiver a significant impact on the ecosystem and almost became extinct right after the introductions. In 1998, when the author started the collection of vetiver, none could be found in the non-agricultural lands. In five years, seven local accessions were collected from different farmlands in the western part of the island and 20 accessions representing germplasm worldwide were received through The Vetiver Network (TVN) in four batches. Thirteen accessions of 'wild' seedy vetiver germplasm were also received in 1998 from the NGPS, USDA. The introduced vetiver germplasm after 1998 has been fully documented and gone through quarantine process, and later preserved in an isolated nursery in the Experiment Farm of the National Taiwan University (NTU), Taipei. Learning from the bitter lessons of failed introduction of various grasses for forage in the past 50 years, vetiver was evaluated for its weedy potential as well as adaptation to various environmental conditions before release to the public. The facility of NTU was used to study the weedy potential in three altitudes: sea level, 1,000 and 2,100 m above mean sea level (amsl). *Wild vetiver was found to be a prolific seed producer and should not be released to the public.*

The method of reproduction of vetiver was investigated after thousands of seeds were harvested in the nursery from the cultivated vetiver germplasm. It was concluded that vetiver is self-incompatible, and before the true sterile genotype becomes identified, there should be no mixing of

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genotypes in the application. To prevent the mixing of genotypes, the DNA profiles for the cultivated vetiver germplasm were developed, and genotyping service was provided by the author's laboratory. Twenty-three locations representing the diverse conditions of climates, soils and adverse environments throughout the island were selected, and 10 to 30 plants of the three selected genotypes were planted to evaluate the adaptability of vetiver in Taiwan. After three years of field observation, it was concluded that vetiver could prosper well below an altitude of 1,500 m amsl in all environmental conditions. It is difficult for vetiver to survive the altitude of 2,000 m amsl, but with full sunlight, it may survive.

The promotion of the vetiver system (VS) was initiated in 1999 after the devastating earthquake hit Taiwan, and preliminary adaptation evaluation of vetiver was done. A website for vetiver in Chinese was open to the public as information distribution center. The information of the website was also recorded on CD-ROM and delivered to related government agencies and consulting companies. Oral presentations were given in more than 20 seminars during the past three years. More than one thousand attendees with engineering background engaged in erosion control business received ideals and principles for adopting VS. The suggested VS specification for construction was also proposed in May 2001. A Chinese version of vetiver brochure translated from the English version published by TVN was released in January 2002.

Three pilot projects for construction were established in 2001. One of them was on the mud-stone region which was the harshest environment for re-vegetation in Taiwan. The success of the project made it become a demonstration site as well as the other two projects. More than 20 small-scale pilot construction projects supported by the Soil and Water Conservation Bureau, the Forestry Bureau, and the Water Resources Agency, were established in 2002. The sale of vetiver slips was initiated by the Experiment Farm of NTU in association with two small-scale farmers in 2002. During the year, 250,000 slips were sold. A commercial network was evolved and started to function in 2003. The progress of VS dissemination is steady and should be booming in the coming years.

Profile of David Booth, the New Indonesian Vetiver Coordinator

David Booth, a British civil engineer with over 20 years experience on a wide range of construction projects in UAE, Nigeria, Kuwait, Trinidad and Indonesia moved to Indonesia in 1989 as a personal choice for his future life. He is also a qualified marketing consultant, teacher and writer, and with these diverse skills he founded a charity called Ekoturin Foundation – now known as East Bali Poverty Project – to introduce sustainable development, through participatory self-help, to the most impoverished communities in Bali's mountainous northeast region.

David and his team pioneered the use of vetiver grass in Bali in March 2000, primarily to prevent erosion on the 60° sandy verges of over 5 km of newly stabilized dirt roads, to open up year-round access to remote health centers and markets for 250 families in isolated mountain hamlets. This was just one element of a poverty elimination program designed to ultimately promote sustainable social and economic development in a very large yet remote mountain region in East Bali, with a total population of over 11,000 people, who were literally cut off from the rest of the island.

By 2002, vetiver grass had undoubtedly proved the most effective means of preventing erosion on sandy mountain tracks and in establishing organic vegetable farms on steep and barren land that could previously only sustain cassava and corn. Vetiver also became a powerful awareness tool in children's integrated education programs, both in developing their organic vegetable school gardens and creative handicraft lessons from the roots and dried grass.

By the end of 2003, vetiver has played a key role in enabling the foundation to empower many communities through eliminating illiteracy and malnutrition as well as initiating organic farming and many appropriate technology programs as a foundation for sustainable social and economic development.

Vetiver is now used by a wide range of customers throughout Bali and further east to Lombok Island as a result of dissemination of vetiver information from field trials, photographs, specimens of children's handicrafts, newspaper articles, the Internet, and word of mouth. As a result, and further strengthened by the recent First Prize Award to David and Ardika Adinata of Ekotourin Foundation, clearer understanding of the benefits of the Vetiver System as a powerful tool to prevent erosion has

been achieved during the recent meetings with the Governor of Bali and the Head of the Provincial Agriculture Department. Full promotion of vetiver is planned to start in early 2004, once a more comprehensive vetiver information and resource center has been developed. As Founder and Chairman, David coordinates all project planning and design, supported by a dedicated and motivated Balinese field team.

Vetiver Hedgerows Help Relief Disaster in Phetchabun Province*

Just a little over two years ago, several villages, notably Nam Ko and Nam Chun of Lom Sak District, Phetchabun Province, located in the lower northern part of Thailand, have suffered most severely from mudslides due to devastating heavy rainfall as the result of a very strong typhoon that hit the region (see Editorial: "The Role of Vetiver in Flood Control" in *Vetiverim* 18, October 2001). The forest in the area has been completely cleared by the villagers to plant cabbages.

In the above Editorial, the Editor has suggested that vetiver be planted along the contour as a means to control future flood as well as to conserve the soil from further erosion. Such a practice has actually been practiced! The (Thai) Land Development Department (LDD) has implemented a project in the areas affected with such disaster. Previously, the areas amounted to 16,000 ha were deforested. It is estimated that, in such steep sloping land, from 0.8-3.2 tons per ha of soil have been washed away annually.

The first attempt made by the LDD was to rehabilitate an area of over 320 ha by planting with vetiver hedgerows along the newly constructed contours in order to conserve the soil. The land areas in between the hedgerows have been planted with upland rice as a cash crop in order for the villagers to earn their income. Subsequently, land consolidation will be made with the assistance of the LDD, which also provides instruction and budget to produce compost.

It was observed that the farmers who planted vetiver along the contours of the sloping land have attained a good status in their livelihood, with sustainable development of their land and a good income from the selling the harvested produces.



**Extracted from "Kom Chad Luek" (a Thai newspaper), of 7 January 2004.*

The sloping upland-rice area on Khao Kho interplanted with vetiver hedgerows along the contour as one of the measures against mudslide for Nam Ko Village

Letters to the Editor

Applying Madagascar's Success in Guatemala

I have been corresponding with an American-based company that specializes in privatizing struggling third world railways (in hopes of getting them interested in the FCE). So far I have not much succeeded in that, but they do turn out to be very interested in our vetiver intervention and its possible application to their railway in Guatemala. I sent them an electronic version of our paper, without pictures, but they want to get a paper copy with pictures, and also the person I have been corresponding with (who has lots of contacts in the rail world) wonders if there would be the

possibility of getting the paper republished in a railway journal. I said that I thought that this would be excellent idea but that he should contact Mrs. Suwanna Pasiri of the Office of the Royal Development Projects Board (ORDPB). So, he will be doing so. You might just give her a ‘heads up’ and see what the ORDPB would think about that. It would be great, I think, to get these ideas more widely distributed. As I told him, *wouldn't it be terrific if the south-south exchange that started with a Thailand-Madagascar collaboration could now be spread to Guatemala by a Madagascar-Guatemala exchange?*

Karen Freudenberger
Director, FCE Railway Rehabilitation Project, Madagascar
<ksf@chemonics.mg>

Yes, it would be terrific! We are waiting and would comply for such a request. -Ed.

Vetiver and Carbon Sequestration

I just ran into Rattan Lal, who was on our vetiver panel and who is attending a carbon-sequestration workshop here at the Academy. He strongly encouraged me to get vetiver folks doing carbon measurements, which he has already engaged with in several locations. At the least, he is willing to provide protocols and consultation; at best, if funds could be found, he could also accommodate a graduate student as a visiting fellow to his fully-equipped lab that can easily run 1,000 soil samples a month. There are a lot of ways that we can, at the least, engage his expertise. So if anyone wants more information, please contact Rattan or give me a holler.

Mark Dafforn
National Academy of Science, Washington, DC, USA
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Thanks Mark, for giving us such useful information. It would be interesting to know more about carbon sequestration. Anyone interested please contact Rattan Lal at <lal.l@osu.edu>. -Ed.

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