

VETIVERIM

A Quarterly Newsletter of the Pacific Rim Vetiver Network

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Editorial

Vetiver Phytoremediation

“Various environmental problems created as the result of deterioration of natural resources, wherever they occur, they continually impact on other areas. Thus, everyone living in any country of the planet should have mutual responsibility in solving and reducing the problem of pollution, as well as reclaiming and rehabilitating the environment to the one that supports healthy living for all human beings.” This is King Bhumibol Adulyadej of Thailand’s message published in a souvenir book prepared on the occasion of accepting a petroleum-cleanup ship donated by Denmark Government on 20 November 1996. It clearly reflected His Majesty’s recognition of the importance of protection and solving the problems of the environment effecting the quality of life of the people, their economy and social impact of the people of the whole nation. This was in line with His Majesty’s idea of promoting the planting of vetiver for soil and water conservation. In addition, His Majesty had urged the practice of using vetiver to solve the problem of environmental degradation through pollution, contamination or intoxication of soil and water, the practice which modern literature calls, “phytoremediation”.

Vetiver can be used to mitigate environmental problems that have already occurred. Depending on the nature of the problems, two distinct processes in cleaning up exist. One known as “reclamation”, which is naturally-caused, while the other, “rehabilitation”, which is human-induced. Thus through phytoremediation, vetiver can help to reclaim wastelands or deserts, or to rehabilitate contaminated or toxicated soil and water. It can be used along with, or in some cases, in place of, mechanical methods. It is an aesthetically pleasing, passive, solar-energy-driven cleanup technique.

Vetiver has been used successfully to reclaim naturally-caused deteriorated land such as wastelands, deserts, degraded soils, etc. However, there are at present increasing rates of human-induced problems of contaminated or toxicated soil and water, especially through agricultural and industrial activities such as pesticide/herbicides; and fertilizer applications, mining, factory residues, etc., which require an efficient system of rehabilitation through the use of vetiver, a simple, clean, low-cost and safe technology.

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Vetiver-Leave Handicraft Awards in Thailand

The Committee for the Campaign on Vetiver Growing under His Majesty the King's Initiative, consisting of the Chaipattana Foundation, the Royal Development Projects Board, the Department of Land Development and the PTT Public Company, has conducted contest on vetiver-leaf handicraft making since 2007.

This year's contest result has recently been announced. The awards were given to 26 awardees, consisting of 13 groups of people and 13 groups of designers.

The 13 awards for the People Group are as follows:

Award of Excellence

Buddhist Fan by the Huai Phlu Buddhist Priest Pavillion

Mrs. Nichapha Khaengraeng
61/15 Mu 2, Ban Pak Lam Pilok
Huai Khayeng Sub-district
Thong Pha Phum District
Kanchanaburi
Tel.: 081 075 9388

Prominent character: Intensive work, based on arrangement of vetiver leaves suitable for the product, using a beautiful natural tone of color. The rim of the Buddhist fan is similar to snake's back, making the product perfect.



First Runner-Up Award

Junior Private Center

Mrs. Nichapha Khaengraeng
61/15 Mu 2, Ban Pak Lam Pilok
Huai Khayeng Sub-district
Thong Pha Phum District
Kanchanaburi
Tel.: 081 075 9388

Prominent character: Extensive use of vetiver leaves and the application of local wisdom by stitching roof thatch, making it strong and integrating it with other materials perfectly.



Consolation Prizes

Three-leg Stools

Ms. Suchitra Rakchan
48/2 Ban Na Sub-district
Si Nakharin District
Phatthalung 93000
Tel. 086-289 7617

Prominent character: The kind of work the villagers can do it. Production is not complicated and can be extended with different patterns so as to make it more interesting by making attractive legs or adding colors to brighten them up



Consolation Prizes**Ant Lighted Grass Box**

Mr. Preeyachat Phloisuk
74 Mu 1, San Phak Wan Sub-district
Hang Dong District, Chiang Mai 50230
Tel. 085-865 6582

Prominent character: Perfectly integrated, intensive, and can be added with technique to make it varied and with story to make it more attractive.

**Boy Scout Camp Model**

Ban Ran Deng School
Kok Sa-art Sub-district
Prasat District, Surin 32140
Coordinator: Maneewan Haruethaithaworn
Tel. 081-549 5818

Prominent character: With students' participation that can be extended to inform the story of the community more clearly as a model. It has creativity that the students can apply to make other models to make it a medium of instruction.

**Khan Tok Dinner Set**

Vetiver Lovers Community
Mu 3, Ping Khong Sub-district
Chiang Dao District, Chiang Mai 50170
Coordinator: Mr. Sophon Thaokaeo
Director, Ban Huai Pao School
Tel.: 086-195 9292

Prominent character: Reflecting natural beauty of old-style Lanna Community by making intensive product using vetiver threads surrounding the set

**Shoe Shelf**

Mrs. Ha Sasithorn
Kosao Village Women Vetiver Product Cooperatives
254 Mu 11, Kosao Village, Thung Kluai Sub-district
Phu Sang District, Phayao 56110
Tel. 087-183 1102

Prominent character: A home-style, intensive useful product that can be self-made using vetiver leaves to wrap around the structure decoratively .

**Key Chain and Telephone Hanker**


Professional Group on Community Products from Valuable Vetiver Leaves
7 Mu 3, Nong Luang Sub-district, Lan Krabu District, Kamphaeng Phet 62170
Coordinator: Ms. Chitnapha Inthapong
Tel. 085-232 9357

Prominent character: Originated from a training workshop with added work for the community to really use it. Tribal dolls can be added, or stressing on the community identity.



<p>Mother's Ceiling Broom Ms. Panadda Thothong 564 Mu 12, Ban Thung Sai Khlung Takrao Sub-district, Tha Takiap District Chachoengsao 24160 Coordinator: Mrs. Rung-arun Thothong Tel.: 080-017 2172 <u>Prominent character:</u> Suitable application of using small amount of vetiver leaves efficiently .</p>	
<p>Tit Bit Container Faek Luang Group 48/2 Mu 4, Khilek Sub-district Mae Rim District Chiang Mai 50180 Coordinator: Mrs. Sombun Rojanil Tel.: 088-401 6920 <u>Prominent character:</u> Quite intensive, with a simple production technique in which the villagers can make use for various occasions. It has Thai-style identity.</p>	
<p>Giraffe Saving Box Mr. Tawan Yuennan 211 Mu 7, Phan Ton Village, Phan Ton Sub-district Kumphawapi District, Udon Thani 41370 Tel.: 090-780 7587 <u>Prominent character:</u> Properly arranging of vetiver leaves with neat piece of work. Good choice of color and pattern, and able to reduce the size and add other useful items such as the place to lay note book, pen socket, etc.</p>	
<p>Father's Grass Mrs. Ampho Khamtha Kosao Village Women Vetiver Product Cooperatives 254 Mu 11 Kosao Village, Thung Kluai Sub-district Phu Sang Districtm Phayoa 56110 Tel. 087-183 1102 <u>Prominent character:</u> A fine piece of work with good creativity.</p>	

The Category of the Designers - 13 awards:

<p>Award of Excellence Drop of Water (Whale Rocking Chair) Mr. Noraseth Sabai and Mr. Supachok Patrekul Industrial Product Design Branch Industrail Technology Faculty Rajapat University - Suan Sunantha U Thong Nok Road, Vachira Sub-district Dusit District, Bangkok 10300 Tel. 087-357 1450 <u>Prominent character:</u> Quite intensive, neat and can make an excellent toy for the children.</p>	
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First Runner-Up

Luminescent Mushroom (lamp shade)

Ms. Suphalak Phamlom and Ms. Pongsuk
Thongkham

Tel.: 082-778 61115

Prominent character: Quite intensive in arranging
vetiver leaves, the use of covering cloth and basic
structure to make the piece perfect and really
useful.



Second Runner-Up

Swallowing Giant (Cushion)

Ms. Phraephan Phupha and Ms. Rotsukhon
Muaengsen

Industrial Product Design Branch

Industrail technology Faculty

Rajapat University - Suan Sunatha

U Thong Nok Road, Vachira Sub-district

Dusit District, Bangkok 10300

Tel. 088-232 1768

Prominent character: An interesting way of
sticthing vetiver leaves, suitable for the design of
the product. In side the cushion can be filled with
plastic bags and tightly-packed vetiver leaves.



Consolation Prizes

Luggage

Mrs. Chanya Sukchit

Chanthaburi Technical College

36/6 Mu 7 Silapornwil Village, Soi 6

Ko Khwang

Mueang District

Chanthaburi 22000

Tel. 081-723 6083

Prominent character: Neat in sewing, concise, and
can be produced for sale and real use. Development
can be made on the pattern and color using natural
dye to add the value of vetiver.



Sweet Summer Handbags

Sweet Team (Ms. Panadda Phosi and Ms. Pornrat Bamrung), Industrial Product Design Branch
Faculty of Architecture and Design
Technical University of Ratchamonkol
Rattanakosin
96 Mu 3 Phutthamonthol Rd. 5, Salaya District,
Phutthamonthol District, Nakhon Pathom 73170
Tel. 081-890 1904

Prominent character: The shape and color are practical. A set has been made. The concept can be applied for real use.



Putta-Nu (Napkin Sets)

Mr. Montri Sikumpha
Industrial Management Branch, Santapol College,
Faculty of Science and Technology
297/1 Udon-Sakon Road, Nong Bua Sub-district,
Mueang District, Udon Thani 42000
Tel. 085-519 6687

Prominent character: An interesting new use of vetiver, using 100% of vetiver to form new shape and suitable for use. With neat work and able to extend for real production by adjusting the structural framework such as using silk, linen and making a set such as place mat.



Slowness of Nature

Mr. Thanawut Akkanisorn and Kitthithat Chomphuwiset
Industrial Management Branch, Santapol College,
Faculty of Science and Technology
297/1 Udon-Sakon Road
Nong Bua Sub-district
Mueang District
Udon Thani 42000
Tel. 089-713 9555

Prominent character: Arrangement has been made to set beautiful colors able to be applied for real use by keeping the end of the rope more neatly.



Round Table

Ms. Naruemon Charoensombunkit
375 Mu 7 Bang Na-Trat Road
Bang Chalong Sub-district
Bang Phli District, Samut Prakan 10540
Tel. 089-496 6750

Prominent character: Interesting form and practical in use. Can be extended by strengthening the legs to support the weight.



The Miracle Vetiver Exhibition



Opening the exhibition



Signing a souvenir book



Drawing of a vetiver plant
by Her Royal Highness



Presenting souvenirs to representatives
of the participating agencies



Observing the making of vetiver handicrafts



Products made from vetiver leaves



Working table made from vetiver board



Clothes made from vetiver leaves



Napkin holders from vetiver leaves



Monkey dolls made from vetiver leaves



Baskets made from vetiver leaves



Lamp from vetiver



Talipot fan (for monks) from vetiver



Rabbit doll from vetiver



2012








presented to

The Vetiver Network International

presented by

A handwritten signature in black ink, appearing to read "Perla Ni".

Perla Ni
CEO Greatnonprofits

<p>Ant Lamp Shade Worker Ants (Ms. Siriwan Phraikaeo and Ms. Atchara Pinket) Industrial Product Design Branch Industrial technology Faculty Rajapat University-Suan Sunatha U Thong Nok Road, Wachira Sub-district Dusit District, Bangkok 10300 Tel. 084-453 3418 <u>Prominent character:</u> Foldable, with suitable proportion and practical in use.</p>	
<p>Bird Nest Lamp Shade Ms. Waewwimol Khongsatian 10 Mu 7 Phanton Village, Phanton Sub-district, Kumphawapi District, Udon Thani 41370 Tel. 087-774 8048 <u>Prominent character:</u> A piece of work that has been managed to form new shape that is quite intensive.</p>	
<p>Lucky Lamp Shade Ms. Thanpitcha Duangnoi and Ms. Sunisa Puangmali Industrial Product Design Branch Industrial Technology Faculty Rajapat University-Suan Sunatha U Thong Nok Road, Wachira Sub-district Dusit District, Bangkok 10300 Tel. 087-204 4564 <u>Prominent character:</u> Proper shape suitable to be used.</p>	
<p>Mouth-shaped Chair Mr. Aphinant Rokkamrai and Ms. Phakhwan Saengnuan Industrial Product Design Branch, Industrial Technology Faculty, Rajapat University – Suan Sunatha U Thong Nok Road, Vachira Sub-district, Dusit District, Bangkok 10300 Tel. 080-568 6853 <u>Prominent character:</u> A perfect piece of work and integrating the materials used.</p>	
<p>Gardenia-shaped Lamp Shade Ms Khanaktha Sisombun Industrial Product Design Branch, Industrial Technology Faculty, Rajapat University – Suan Sunatha U Thong Nok Road, Vachira Sub-district, Dusit District, Bangkok 10300 Tel. 082-468 6003 <u>Prominent character:</u> New style of shape and employ various techniques of vetiver leaves arrangement.</p>	

The Vetiver Network International Released Certificates in Jingzai of China*

In order to promote the application of the Vetiver System in the Dabie Mountains of China, which cover about 100,000 sq.km lying at the boundary area of three provinces, i.e. Anhui, Hubei, and Henan, and to bring local farmers substantial benefit in economy and ecology, the Vetiver Network International released certificates to four farmers in Jinzhai County of Anhui Province of China, for doing an outstanding job since 2009.

Another important aim is to encourage women in the mountains to design and produce more and better vetiver handicrafts so as to improve their social and economic situation. The ceremony was organized on 26 September 2012. The Coordinator of the China Vetiver Network and leaders of local government attended the ceremony. The details of the farmers who received certificates are shown in Table 1.

Table 1. The international vetiver awardees and their contributions.

Name	Level	Main contributions
Ye Naiquan	1 st	Organized first vetiver handicraft training course in Jinzhai County of Anhui Province in 2011. After the training, he insisted on vetiver planting and established a demonstration plot of soil conservation using vetiver hedges. At the same time a vetiver nursery was established in order to extend the vetiver system. Further more, he and his colleagues organized and formally registered a Vetiver Cooperative to promote the vetiver system, stimulate vetiver handicraft production and market development. Besides, he selected vetiver handicraft products exhibited at the Canton Fair, Agriculture Products Exhibition in Shanghai, and Agriculture Product Fair in Anhui Province in 2011 and 2012.
Xu Lixia	2 nd	Learnt and grasped vetiver handicraft technology through vetiver handicraft training course in 2009. After that she actively was involved in vetiver handicraft design and promotion. In addition, she grasped training skills and independently carried out vetiver handicraft training. As chief of trainers, she successfully trained 20 women in Jinzhai County and Yuexi County in 2011.
Zhu Yingxiu	3 rd	As the chief of The Woman's Federation of Dafan village, She is actively involved in vetiver handicraft training and production, and the routine organization of vetiver handicraft production and marketing since 2011.
Zheng Dafang	3 rd	As a common farmer she studied vetiver handicraft technology very earnestly and grasped the technology very well. She produced the largest quantity of vetiver handicraft products in the village. In addition, she helps others to study vetiver handicraft technology and acted as a model of vetiver handicraft trainees.

As early as in 2009, another four farmers in Guangxi Province received awards from The Vetiver Network International for their outstanding contribution in vetiver technology in soil conservation and vetiver handicraft training and production.

(See photographs on central pages)

* By Liyu Xu, Coordinator, Chinese Vetiver Network, Nanjing, China.

The 2012 Grand Prize for Small Projects*

The American Academy of Environmental Engineers awarded Leggette, Brashears and Graham Inc. the 2012 Grand Prize for Small Projects for "Innovative Phytoremediation Process Utilizes Landfill Leachate as a Resource in Lieu of Traditional Disposal As a Waste"

This project relates to a landfill in Mississippi. Brad Granley and Paul Truong were very involved in the design of the project. Our congratulations. "Integrated Approach - The use of phytoremediation at landfill represents an integrated approach having a profound environmental impact. Groundwater is protected through minimization of surface water infiltration and better control of leachate within the landfill, which can otherwise result in contamination of aquifers, especially at old facilities like GCAL, which has no bottom liner."

Surface water: Vetiver reduces infiltration which helps prevent leachate seeps (leachate that flows out the side of a landfill and to surface water), and can dry up existing seeps. Vetiver also removes sediment and nutrients from surface water runoff. Soil erosion is reduced. Leachate distribution does not create a problem with soil. The plants effectively utilize leachate compounds as nutrients. Also, a subsurface "biological treatment reactor" develops which effectively breaks down and mineralizes a wide range of compounds.

Air quality: Adverse impacts to air quality are greatly reduced. Using phytoremediation at GCAL instead of hauling 3.5 million gallons of leachate per year results in the following:

- 1 year: 232,000 miles not driven;
- 38,000 gallons of diesel not burned (6 mpg);
- 380,000 kg CO₂ emissions (10 lbs CO₂/gal diesel burned) 30 years:
- 7 million miles not driven;
- 1.14 million gallons diesel not burned;
- 11,400,000 kg CO₂ (25 million pounds CO₂)

Fast growing vetiver will sequester 113,000 kg CO₂/year through carbon fixation. Quality and User Satisfaction The GCAL project has exceeded Republic's expectations. The system has performed as designed and nearly 100% of leachate generated has been utilized on site, well ahead of anticipated results. Republic is also thrilled with the cost savings. Phytoremediation system low-cost O&M has cut annual costs by 60%, saving millions over a standard 30-year post-closure care period. Per Republic, "the approach is a game changer for leachate management." The work has also attracted the serious interest of other multi-billion dollar US solid waste companies. Internationally, the first three vetiver system installations in Latin America are underway for the largest solid waste company in Mexico."

Recent Activities of Vietnam Vetiver Network**

The Vetiver system has been widely applied in Vietnam since 1999. Recently, up to May 2012, the activities related to vetiver have been summarized in the following paragraphs:

Research:

Danang University:

- Testing the ability of Vetiver in dissolving Dioxin.
- Producing a type of cheap polymer that can absorb water and leak slowly back to the soil. This will reduce the cost of watering and improve soil condition in dry areas.
- Wastewater treatment in shrimp ponds at Nui Thanh, Quang Nam.

* By Richard Grimshaw, see <<http://www.aaee.net/E32012GPSmallProjects.php>>.

** By Tran Van Man, Vietnam Vetiver Network Coordinator, Danang, Vietnam, <man.tran@sbtv.com.vn>

- The effects of salinity condition on the growth of vetiver root in coastal areas.

National University:

- Testing and comparing bamboo with vetiver in wastewater treatment.

Seminar and Conference:

- Seminar in coastal protection in Ho Chi Minh city on January 3, 2012.
- Seminar about infrastructural and environmental protection in Danang on January 7, 2012.
- Seminar in dam safety in constructions and operations in Danang on June 26, 2012.

Other Activities:

- Evaluating the vetiver projects in Mekong Delta.
- 3,000 plants have been ordered in Lao Cai for landslide prevention and another 3,000 plants in Quang Nam for the same purpose.
- Vetiver trial in Quang Nam for slope protection along the road work in rural area.
- 3,200 m canal using vetiver and funded by the World Bank has been approved at design stage and be implemented next year.
- 5-km road work using vetiver has been approved and constructed in May 2012.
- A handicraft company is doing a trial using vetiver to produce handicraft products.
- The conceptual plan for ICV-6 has been finalized.
- Visiting trip to Thailand to get handicraft experience.
- Invite the Chairman of the Continuing Committee for the Sixth International Conference on Vetiver (ICV-6) to visit and evaluate the facilities in Danang for ICV-6.

<p align="center">Second Latin America International Conference on Vetiver System (LAICV-2)</p>
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The uses of the Vetiver System and its environmental, economic and social benefits are well known worldwide. In Latin America several countries are using them and realizing how good are they, and how important they are for a sustainable development. As a bioengineering tool for control erosion and environmental protection or as a phytoremediation technique: “Vetiver grass is a plant for the future”. To continue promoting techniques and breakthroughs in Latin America and helping communities and government’s needs, the idea of a Regional Conference was born. The first one was in Chile 2010 with an excellent result. The Colombian Vetiver Network, with full support from TVNI, will organize the Second Regional Conference (LAICV-2) in Medellin, Colombia in October 2013, with a focus on sustainability. LAICV-2 will promote “Vetiver Culture” in all Latin America and will help to strengthen local and international networks.

Theme: “Vetiver System: Green Consciousness for Sustainable Development”

Place: Medellín, Colombia

Organizer: J. Daniel Londoño G. MECETA SAS

Red Colombiana del Vetiver

Red Latinoamericana del Vetiver

Sponsors: The Vetiver Network International

Vetiver System - Proven & Green Environmental Solutions

Patron: Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand

Conference Aim

- Introduce Vetiver system breakthroughs in Latin America and around the world
- Promote “Vetiver culture” and it uses in Latin America
- Support local and international networks

Conference Date: 3 to 5 October 2013

Day 1: AM Infrastructure protection

PM Environmental protection

Day 2: AM Socioeconomic and progress report from LA countries

PM Open forum on future needs and focus

Day 3: Day trip to visit on vetiver sites

Expected Participants: 50 international and 150 national participants

Organizing Committee:

Chairman: J. Daniel Londono G. (MECETA)

Deputy Chairs: Jaime Ramirez (Vetivernet),
Claudio Ruben Daza (Vetivercol)

Local Advisor and Coordinator: Jorge Londono M. (MECETA)

Secretary: Niza Sepulveda (Choco University)

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Jim Smyle, President, TVNI

Paul Truong, Technical Director, TVNI

Oscar Rodriguez, Coordinator, Latin America Vetiver Network

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Abstract of Vetiver Articles

Title: Progress on developing vetiver phytomonitoring system for detecting hazardous volatile organic compound contamination in groundwater and soil.

Authors: T. Phenrat¹; P. Chapud²; N. Jokthong²; P. Wisedsing²; F. Malem²; P. Soontorndecha²; R. Parichatprecha³; and P. Taranet,⁴

¹ Research Unit for Integrated Natural Resources Remediation and Reclamation (IN3R), Department of Civil Engineering, Naresuan University, Phitsanulok, Thailand

² Environmental Research and Training Centre, Department of Environmental Quality Promotion, Bangkok, Thailand.

³ Land Development Department, Bangkok, Thailand

⁴ Department of Civil Engineering, Faculty of Engineering, Srinakharinwirot University, Bangkok, Thailand.

Keywords: Soil contamination, tetrachloroethylene, dynamic migration, carcinogenic substances, Rayong, Map Ta Phut Industrial Estate.

Abstract:

Groundwater and soil contamination with hazardous volatile organic compounds (VOC) such as tetrachloroethylene (PCE) is a vexing environmental problem commonly discovered in both developing and developed countries including Thailand. Dynamic migration of these carcinogenic substances to receptors such as nearby villagers and sensitive environment can pose a serious public and environmental health threat. As a result, an effective subsurface monitoring system is imperative. Nowadays, we rely on costly engineering subsurface monitoring systems for this mission. The present research reports the recent progress on developing vetiver system as an alternative phytomonitoring system for detecting volatile organic compounds in groundwater and soil. We used groundwater and soil from an actual VOC contaminated site in Map Ta Phut Industrial Estate for a laboratory scale experiment. Conceptually, VOCs in groundwater and soil are captured by vetiver root and subsequently translocated to the shoot. Then, we harvested the vetiver shoot followed by sample preparation via hot methanol extraction. VOCs in the extract were then quantified by GC-MS. We found that vetiver can effectively detect PCE in the subsurface environment. Vetiver can uptake and accumulate PCE in the shoot more than 100 times of the willow tree used for VOC phytomonitoring in a Superfund Site in the US. This first laboratory study illustrates the full potential of using vetiver phytomonitoring system in a field scale application.