VETIVERIM

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Editorial

Lawn Grass, Bamboo and Vetiver

Vetiver has many unique features suitable for soil conservation such as an extremely deep, vertical root system that will hold soil particles together; tough above-ground stems that will stand the force of a strong current in a flash flood, especially when planted close together in rows across the slope or on a contour line. Improperly planted however, vetiver hedges will not provide erosion-control.

In the unfortunate case of a large mining operation in Madagascar where vetiver was improperly planted on a newly bared slope to prevent erosion, the resulting total failure of the system was such that the Company "don't want to hear about vetiver again", claiming it does not work and they have closed the door on the technology. They have hired a large firm that has convinced them to use lawn grasses and bamboo" (see detail in the "Letters to the Editor" in this issue of Vetiverim). Lawn grass and bamboo have been proposed in place of vetiver.

In spite of being claimed as the "known and proven plants for soil conservation ", Yoann Copin of TVNI, believes that lawn grass and bamboo "can't do the heavy soil retention work that vetiver can".

Although having no research back up, the Editor has observed that: (1) lawn grass has a shallow root system which cannot withstand severe drought, and strong wind or water currents, and (2) bamboo can be washed out of the ground because it has a shallow root system in comparision with its high above-ground biomass. There may be an argument that a thick bamboo forest is a climax forest which can withstand strong wind and water current. However, it takes a long time before such a thick bamboo forest can be established. Bamboo is definitely not a pioneer plant. *Thus, lawn grass and bamboo should not be used on a newly bared slope to prevent erosion.*

John Greenfield of TVNI has already provided his response regarding the lawn grass and bamboo. Other readers of Vetiverim are invited to share their experience on this issue in order to bring back the good name of vetiver and TVNI. More importantly, the merit of vetiver should be made known to everyone who is faced with the problem of soil erosion, especially on a newly bared slope.

The readers are invited to submit the article on the use of lawn grass and bamboo *versus* vetiver grass in erosion control for inclusion in the next issue of Vetiverim.

Abstracts of Published Vetiver Articles

Below are two abstracts of papers on vetiver recently published in the journals. The Editor would like to invite the authors of the papers on vetiver which have been published in scientific journals to submit their papers for inclusion in future issues of Vetiverim.

Title: Domestic wastewater treatment using vetiver grass cultivated with the floating platform technique

Authors: Kanokporn Boonsong, Department of General Science, Faculty of Science; and Monchai Chansiri, Inter-Department of Environment Science, Graduate School, Chulalongkorn University, Bangkok, Thailand.

Abstract: This study was established to examine the efficiencies of *Vetiveria zizanioides* (L.) Nash] cultivated with the "floating platform technique" to treat domestic wastewater. The study was divided into three phases of eight weeks each, using 7-, 5- and 3-d hydraulic retention time (HRT), respectively. Two different control parameters including vetiver ecotypes ('Songkhla 3', 'Surat Thani' and no plant as control) and wastewater strengths (HCW: high concentration wastewater) and LCW: low concentration wastewater) were examined. The average HCW influent contained 90.12 - 94.88 mg/L BOD (biochemical oxygen demand), 41.025 - 52.806 mg/L TN (total nitrogen) and 5.892 - 6.657 mg/L TP (total phosphorus), whereas the average of LWC were 44.28-58.92, 34.731 - 42.144 and 4.838 - 5.482 mg/l, respectively. The results indicated that the treatment efficiencies of different HRT and wastewater concentrations were significantly different. The 7-d HRT showed the highest treatment

efficiency. The treatment efficiencies of BOD, TKN and TP in HCW were higher than in LCW, with the average of 90.5 - 91.5, 61.0 - 62.5 and 17.8 - 35.9%, respectively. The treatment efficiencies of 'Songkhla3' and 'Surat Thani' ecotypes were not significantly different. However, the treatment efficiencies of BOD and TP of 'Surat Thani' were slightly higher than 'Songkhla3'. The biomass increment of 'Surat Thani' in LCW was higher than in HCW, whereas Songkhla3 showed the opposite trend. Thus, the overall results suggested that the optimal condition of this technique should be designed at 7-d HRT and planted with 'Surat Thani' ecotype. However, if wastewater contained high nutrients, 'Songkhla 3' ecotype should be planted.

Keywords: Hydraulic retention time**,** wastewater, BOD, ecotypes**, '**Songkhla 3', 'Surat Thani'.
Published in: AU Journal of Technology 12(2): 73-79 (October 2008)
Full paper available from: <www.au.edu>
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Title: Effect of Soil Amendments on Heavy Metals and Growth of Vetiver planted on Iron Ore Tailings

Authors: Nualchavee Roongtanakiat, Department of Applied Radiation and Isotopes, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand; Yongyuth Osotsapar, Department of Soil Science, Faculty of Agriculture, Kasetsart University Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand; and Charoen Yindiram, Thailand Institute of Nuclear Technology (Public Organization), Chatuchak, Bangkok 10900, Thailand

Abstract: A greenhouse experiment was conducted to evaluate the effects of soil amendments on growth, performance and the accumulation of primary nutrients as well as Fe, Zn, Mn and Cu in vetiver. 'Ratchaburi' vetiver ecotype plantlets were planted on iron ore tailings amended with compost and chelating agents (EDTA and DTPA). The results indicated that iron ore tailings contained high concentrations of heavy metals with total Fe, Zn, Mn and Cu concentrations of 63,920, 190, 3,220 and 190 mg kg-1, respectively and low contents of primary nutrients and organic matter. The combination of soil amendment materials, especially DTPA and compost, was more effective than sole chelating agents and sole compost in enhancing vetiver growth, nutrient and heavy metals uptake. The soil amendments used in this study did not affect Fe and Zn translocation from vetiver roots to shoots. However, chelating agent amendment could increase Cu translocation, especially in combination with compost, while it slightly decreased Mn translocation. The average mean translocation factors of Mn, Fe, Zn and Cu were 0.86, 0.71, 0.69 and 0.55, respectively. These results indicated that vetiver is a potentially useful plant for phytostabilization and rehabilitation of iron ore mine tailing areas.

Keywords: phytoremediation, phytostabilization, compost, soil amendment, EDTA, DTPA
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Full paper available from: <rdispm@ku.ac.th>
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Vetiver System for Wetland Improvement*

In my previous post, I received a VCD from Ethiopia that shows some truly remarkable work being done with vetiver systems in the area described by Debela Dinka. The VCD is of the Wichi Integrated Wetland Project located in the Mettu Woreda of Illubabor Province. This project covers 2800 ha and 1688 beneficiaries. It was managed by The Ethiopian Wetland Natural Resources Association (EWNRA) and SIDA (Swedish Development Agency) The project was started in 2005. Crop yields have increased by 20 to 40% due to VS. Most interestingly though has been the impact of VS on the wetlands. Previous to the project due to high erosion and increased rainfall runoff the wetland areas associated with the project had totally dried up. This effected grazing for livestock and

also the biodiversity of the area (particularly bird life). As a result of the wide spread introduction of vetiver hedgerows the wetlands have been restored (rainfall runoff reduction, groundwater recharge, improved spring flow) to the extent that there are now year round ponds, restored bird life, and excellent grazing.

Incidentally one of the larger farmers has planted 240 km of vetiver hedgerows on his farm!! Some years ago a World Bank rural water team made a somewhat similar observation in parts of Karnataka (India) where vetiver hedgerows had been introduced under the World Bank funded Rain-fed /watershed management projects in that ephemeral streams were observed to flow for another three months into the dry season. John Greenfield also observed that farm wells were being recharged through improved groundwater flows due to upslope vetiver hedgerow planting. Unfortunately nobody paid much attention to these observations. We have observed similar results in watershed conservation (using VS) in Thailand. With these examples in mind I would suggest that VS is promoted as part of wetland improvement packages.

TVNI Vetiver Prizes 2008

The Vetiver Network International (TVNI) has recently announced the TVNI Vetiver Prizes 2008 as follow:

1. Vetiver System Picassa Web Gallery Prize

In 2007 Tony Cisse won $500 for the best Picassa (Google) photo gallery dedicated to the Vetiver System. TVNI will award another $500 at the end of 2008 for the the best VS gallery on Google Picassa. We are looking for innovative and informative galleries with good captions.

2. Vetiver Sytems Innovation Prize.

TVNI will award a $200 prize for the best VS related innovation posted on this website. See for example NETPOTS on our website (front page). The prize will be awarded at the end of 2008.

3. The Best Video on VS

TVNI will give a $500 prize for the best video on VS produced in the next 12 months. The

* *By Richard Grimshaw, Chairman, Board of Directors, the Vetiver Network International, Washington, DC, USA <r.grimshaw@comcast.net>*

following videos are now available on the website:

ϖ Two videos on Ethiopia's Sustainable Land Use Forum (SLUF) on Google Video. They are worth looking at as they provide an idea of the extent that VS is being used in that part of Ethiopia and why it should be used widely elsewhere. The links for the videos are:

<http://video.google.com/videoplay?docid=-3760736424441334833> and
<http://video.google.com/videoplay?docid=90357490360931964>

In order to view these videos, there is a need of high speed internet connection.

ϖ Una Matica Sagrada - A Holy Little Plant (Vetiver Grass) produced by Fundacion Empressa Polar. This movie (in Spanish) is about how Venezuela women and girls have learned to use vetiver grass for making handicrafts and for on-farm erosion control. The program was sponsored by Fundacion Empressa Polar and the movie was produced by Polar. In the second half the movie repeats itself with English subtitles. As a result of this and the Thai vetiver handicraft programs, there are now many other countries starting to use the Vetiver System for handicrafts and other green applications (14 min). The link for the video is: <http://www.vetiver.org/g/new.htm>

ϖ Vetiver Grass - The Hedge Against Erosion: A Technology for Soil and Water Conservation and Embankment Stabilization. This video was first prepared in 1995 and is a voice over slide production describing how vetiver grass technology works. Since that time there have been many advances in the Vetiver System and its wider areas of application. However the basic technology remains very much the same, and the video provides a useful entry point for a new user (27 min). The link for the video

is: <http://www.vetiver.org/g/new.htm>

ϖ The East Bali Poverty Project: This video focuses on educating children and through them the conservation and rehabilitation of their family land. TVNI has posted this video on:

http://video.google.com/videoplay?docid=7648948557201400672.

This video, produced by Sarah Matthews of Saffyshine Production as part of a Brock Initiative and the East Bali Poverty Project, is a training video that shows how the Vetiver System is a vital component of the East Bali Poverty Project and how it has had an impact on children and their families. The video (32 min.) includes animations, film and narration by people intimately connected to the project. The narration is in Indonesian with English subtitles. Learn more about the East Bali Poverty Project at project website: http://www.eastbalipovertyproject.org/

TVNI intends to expand the use of vetiver videos. If anyone is planning to make short, 5-15 min videos on VS and would like to upload to Google Video, you can either upload them yourself or send a DVD to Dick Grimshaw (r.grims@comcast.net>) and he will do the uploading. If you upload your own video please send him the url link. Use Google Video and not U-tube. Please make sure that Vetiver System is included in the descriptive text that goes with the video.

Vetiver Bank Set Up in Thailand

Several agriculture-related, non-conventional Banks have been set up in Thailand, e.g. Buffalo Bank; Wild-flower Seed Bank; Paddy Rice Bank; Rice Grain Bank; Crop Seed Bank, etc. The main difference between these Banks and the conventional monetary Bank is that the former is non-profit and non-monetary in nature. Members can draw the item they want from the bank when needed and return it with interest to the bank at a later date when the farmer has in his possession the item that he has produced/multiplied. For example, a farmer who needs draught animals to plow his land, he can borrow a female buffalo from the bank and use it on his farm for a period of time. When it has produced a few calves, the mother buffalo is returned to the bank as the capital, and a calf as the interest. The same principle applies to other Banks.

While the results of the competitions of "Vetiver Planting", and "Vetiver-planting Promotion", organized by the PTT Public Company, Thailand were announced, at least three Vetiver Banks were revealed. They are:

1. Established by Mr. Thongdee Inta, Pratu Pa Sub-district, Mueang District, Lamphun Province in the category 'Vetiver Planting'.

As a 'Soil Doctor', a volunteer on soil conservation practice of the Land Development Department, Thongdee learned about the value of vetiver and started to plant vetiver in 2003 along the ditches of his orchard. Normally he had to dig up the mud from the bottom of the ditches and put it onto the banks 3 or 4 times a year. With vetiver planting along the banks, he did not have to do this tedious job again. He also learned that vetiver has several direct and indirect benefits. For example, it absorbs residue of potassium chlorate applied to his longan plants to induce off-season flowering; it helps the longan plants to be in good health, which without vetiver, they were in poor health for a long period of time. Moreover, the crops bordered with vetiver plants were greener and produced higher yields than the ones without it. When the neighbors observed that vetiver has provided several benefits to his farm, they came and requested slips of vetiver for planting on their farms. Instead of giving them free-of-charge, he loaned the slips from his 'Vetiver Bank' to them on condition that the borrowers have to return the same amount of slips to the Bank plus the interest, i.e. an extra amount of slips so that he can loan them to other farmers.

2. Mr. Pakpum Poya, Ping Kong Sub-district, Chiang Daun District, Chiang Mai Province in the category 'Vetiver-planting Promotion".

A community-coordination officer of the Chiang Daun Watershed Management Unit, Pakpum is involved in coordinating the environmental issue, the self-sufficiency economy including the vetiver

technology. He was responsible for providing the know-how on vetiver to the community and extending the knowledge on vetiver planting to the villagers. He also encouraged the villages to plant vetiver in the villages on special-occasion days. He set up demonstration plots and let the villagers observe the successful results of growing vetiver. He encouraged the villagers to plant vetiver on public lands in various villages. He also organized a training course on vetiver for the villagers, teaching them on how make vetiver products and vetiver compost. One of his successful tasks was the establishment of the 'Vetiver Bank' in Huai Pau Village School and loaned vetiver slips to the villagers who want to grow vetiver on their lands on the condition that they had to return the slips with interest back to the Bank at a later date.

3. Ban Sang Housewife Group, Khi Lek Sub-district, Mae Rim District, Chiang Mai Province in the category "Veiver-planting Promotion".

With 20 members, the Group was active in vetiver-planting promotion. In addition to providing the know-how on the technology of planting vetiver to the villagers, the Group encouraged the villagers to plant vetiver on their land and to produce vetiver handicrafts such as plates, baskets, plate mats, pencil boxes, etc from vetiver leaves. A vetiver multiplication plot was set up to provide slips for planting. The same principle of 'Vetiver Bank' was practiced.

The Royal Thai Army's Activities on Vetiver

In order to join the nation in celebrating His Majesty the King's 80th Birthday Anniversary in 2006, the Royal Thai Army has conducted various activities during 2003-2006, and continued on in 2007. These activities can be categorized under the following headings:

Promotion

1. The policy has been set up such that all affiliated units that possess an area for plating vetiver to consider planting vetiver for soil and water conservation by planting vetiver along the rims of ponds, on the steep edge of roads, etc. All works have been 100% accomplished, together with the expansion of the technologies to all personnel and farmers living around the units.

2. With respect to the multiplication of vetiver, the units originally received the vetiver stocks from the land development stations in each area. They then multiplied the vetiver plants in order to have enough planting material for the units themselves as well as providing planting material for other units as well as the farmers and other people who are interested in planting vetiver.

3. Demonstration plots were set up in order for the army personnel, the students, the farmers and other interested persons to see for themselves the benefit and to appreciate the usefulness of vetiver.

Public Relations

1. In the headquarters in Bangkok, the Royal Thai Army has released information about the activities on vetiver through occasional broadcasting in the radio stations as well as the Army's Television Station (Channel 5).

2. In the provinces, the units that have their own radio stations had released information on vetiver planting as a public service. This has received considerable success as evidenced from the in-coming telephones asking for more information and the brochures.

Knowledge Management

1. In their headquarters in Bangkok, the Directorate of Civil Affairs, the key staff unit responsible for command and control of the operating units, have organized a seminar on vetiver to be held once a year in order to provide additional knowledge on vetiver and to gain experience from the experts. They have also organized a study tour of vetiver planting by other government agencies such as at the Huai Sai Royal Development Study Center, the Khao Hin Son Royal Development Study Center, etc. These have enabled the personnel to gain knowledge and experience with vetiver technology so that they can extend this to other personnel and the farmers around the units.

2. In the provinces, each unit has organized training programs for the personnel (officers and the privates) on a monthly basis in order for them to realize the usefulness of vetiver in soil and water conservation. These programs have enabled the personnel to appreciate the value of vetiver and to extend the knowledge to their families. In addition, there are four units which act as the center for learning; these are: (1) Central Region Sufficient Economy Philosophy Learning Center, located at the 11th Infantry Division, Chachoengsao Province, (2) Northern Region Sufficient Economy Philosophy Learning Center, located at the 3rd Animal and Agriculture Unit, Mae Rim District, Chiang Mai Province, (3) Southern Region Sufficient Economy Philosophy Learning Center, located at the Surat Thani Army District,, Surat Thani Province, and (4) North-eastern Region Sufficient Economy Philosophy Learning Center, located at the Sura Thammapithak Base, Mueang District, Nakhon Ratchasima Province. These centers demonstrated all the theories pertaining to vetiver and exhibited them in the centers. They also organized training on vetiver for farmers, and youths who made a visit to the centers.

Administration

1. The Royal Thai Army, through its Directorate of Civil Affairs, has regularly set task forces to visit and advise operational units. It also cooperates with the Subcommittee on the Promotion and Utilization of Vetiver of the Royal Development Projects Board in monitoring the activities conducted by various units in the provinces.

Further Implementation

1. Under the framework of the 4th Master Plan (2007-2011), the Royal Thai Army has authorized its affiliated units to implement the project "The Royal Thai Army plants vetiver to celelbrate His Majesty the King's 80th Birthday Anniversary (2007-2011)" based on the recommendation of the Master Plan by recognizing the urgent need in using vetiver for soil and water conservation. The units shall continue to plant and multiply vetiver within their units. The units shall continue to receive support from the Land Development Department, and to extend the knowledge to training of the personnel and expanding to the farmers and interested persons. This is done by actually planting vetiver in the field to appreciate its real value For example, planting vetiver around fruit trees to retain moisture which makes the trees grow better and gives a better yield with better taste. The Royal Thai Army will cooperate with other government agencies in order to integrate the project to achieve the best result as desired by His Majesty the King.

Activities of the Vietnam Vetiver Network

The Vietnam Vetiver Network has been now updated and is running its program in English and Vietnamese: see: http://www.vetivervn.org

It is a good site and worth visiting. In particular the activity Links, starting at:
<http://www.vetivervn.org/Mainpages/ENContents/VNVN_Activities.htm> are most interesting and reflect the successes of VS - also pointing out where vetiver has not been so effective.

It is interesting to note that VS in some instances costs only 1% of the concrete alternative.
The role of the private sector is noted where one Company, owned by Mr. Nguyen Thanh Su, is now undertaking its own tissue culture production after Cantho University reached its limit of supplying him a weekly demand of 20,000 plants per week. Congratulations to the Vietnam Vetiver Coordionator - Tran Tan Van.

Letters to the Editor

Lawn Grasses, Bamboo and Vetiver in Heated Combat

I received an email from Yoann Copin in Madagascar who is working with a large mining operation. He would like to know if anyone has had experience stopping/slowing soil erosion using either lawn grasses or bamboo. I would like to ask the network, and your newsletter, read by a large number of people with experience in erosion control, might be able to provide an answer. The following is his statement:

"The mining operation in question will be the largest in the world to date. It will displace a huge amount of soil to reach an important mineral deposit. The consortium will excavate the soil that contains the mineral, mix it with water and slosh the sludge through a huge to be constructed duct down from the mid-plateau region of Madagascar to the East coastal (160 km) port of Tomasina where the slurry will be separated; the extracted mineral hauled off to other countries, while billions of tons of slurry will be spread about in nearby mountain range. So much for the environmental impact. The same company a year or so ago asked a guy to put in vetiver on a newly bared slop to prevent erosion. Unfortunately, the person was inexperienced and did the Vetiver Network a huge disfavor. The job was poorly executed; spacing too large and many of the plants died or were washed away. As the project is getting on and the company is scrambling for solutions, they don't want to hear about vetiver, claiming it does not work and have closed the door. They have hired a large firm that has convinced them to use lawn grasses and bamboo. Our Vetiver Network guy (who was working on a very successful vetiver application for mining project in the South of the country when the call for tender was issued, and only found about the catastrophic application after it had failed) needs to find proof that compared with the Vetiver System, specialized lawn grasses (one variety must be from South Africa) and bamboo, which are "known and proven plants" can't do the heavy soil retention that vetiver can.

What we are looking for is any research, experiences and testimonies of applications of any lawn grass or bamboo to stop/slow soil erosion."

Criss Juliard, The Vetiver Network (International), Morocco
<cjuliard@mtds.com>

The same mistake was made in Thailand. I have seen a lot of plots in which vetiver slips were planted too far apart and not in contour line. As a result the soil was washed away when it rained. You were right, these people have done a lot of damage to the Vetiver Network. As for bamboo, its root to shoot ratio is so wide that the root cannot support the weight of the above-ground part and most likely blown down by strong wind, especially when the soil is soggy wet after heavy rains. This has happened in Thailand when a depression that brought heavy rains to fall to the steep slopes where bamboos were growing - ***Ed****.*

Response on the above by John Greenfield

I don't have any research proving that lawn grass is not useful for soil conservation, only obvious anecdotal evidence in the fact that I would not use it as it has a root system extending only a few centimetres into the soil which is not capable of withstanding the effects of runoff or being buried under silt. Apart from that there is plenty of research showing that the variety of lawn grasses can't withstand silt inundation, droughts, fire, wind, grazing or differing soil conditions. Bamboo has shallow roots and can be washed right out of the ground by extreme runoff. Bamboo is the worst possible plant to protect river banks as it can be easily washed out in a flood, transported down river as a massive clump to wash up against even large bridges, forming a "Beaver Dam" capable of destroying the whole structure.

With 'grass' being used to control erosion Paul Truong knows how ineffective the strip cropping was in the Darling Downs, as opposed to the vetiver hedges. On the Big Island of Hawaii, I

was faced with a problem of handling the enormous sediment output from the Hutchinson's Sugar Mill in Punalu flowing over our ranch on its way to the sea. This was soil washed from the roots of the sugarcane after it had been mechanically harvested. Usually, in Hawaii, this 'effluent' was dumped into the sea but it left such a signature that it could be detected from satellite imagery. As we were not allowed to introduce vetiver grass into Hawaii then, we diverted the runoff into absorption banks that built up terraces. This was very successful - so successful that Hutchinson's Sugar Mill wanted to charge us for their soil. Vetiver hedges would have been ideal for this job, and will be in Madagascar. One of the major benefits of VS is that you can run the hedges for kilometres without fear of them 'overtopping' or bursting. Constructed banks, which do not filter runoff, but accumulate it, have a limit of about 300 m before necessitating spillage in to a drainage outlet. So you would need a lot of constructed banks to be safely effective, also when the constructed banks have filled with silt, they would have to be built 'higher', a vetiver hedge would do that 'automatically'.

Surely in Madagascar there is enough evidence that VS works, couldn't the mining people be taken there and shown the results?

John Greenfield
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