THE USE OF VETIVER SYSTEM IN AFRICA

VETIVERIA ZIZANIOIDES
The Vetiver System or Vetiver Grass Hedge Row technique (VGHR) as it is often referred to, is based on the use of Vetiver grass (Vetiveria zizanioides) for a wide range of applications, namely soil erosion & sediment control, land reclamation and waste water treatment.

The VS/VGHR was first developed by the World Bank for soil and water conservation and is now being widely used in over 100 countries.

The plant is sterile, non invasive, flowers, but sets no seeds hence it has no weed potential.
It is tolerant to most adverse conditions, high levels of pesticides and herbicides and also to a wide range of toxic and heavy metals. Temperature variation from -14° C to 55 ° C, Soil pH from 3.0 to 10.5, High level of tolerance to soil salinity, sodicity and acid sulphate.

Vetiver is an “ecological-climax” specie. It outlasts its neighbours and seems to survive for decades showing little or no aggressiveness or colonization ability. It can easily be eradicated using “Roundup”.

Extensive research has been carried out by Dr. Paul Truong of Veticon Consulting, Brisbane, Australia, who has also supplied some of the technical information.
MORPHOLOGICAL CHARACTERISTICS

Dense hedges when planted closely together
MORPHOLOGICAL CHARACTERISTICS

Stiff & Erect stems on inclines of 45°
The mean design tensile strength of Vetiver roots is ± 75 Mpa - one sixth of mild steel.

An extremely deep & massive finely structured root system.

SPECIAL MORPHOLOGICAL CHARACTERISTICS
FIRE Damage to Vetiver Plants
2 Months later
Totally recovered plant
ADAPTABILITY RANGE OF VETIVER GRASS

Lesotho Highlands Project
Elevation 1900m
Temperatures -14°C & 55°C
APPLICATIONS IN CIVIL CONSTRUCTION
Side Slope Stabilisation using VS & Hydroseeding
THE HYDRAULIC SEEDING MIXTURE IS A COMBINATION OF

- Selected Seed
- NPK Fertilisers
- Fibre Mulch
- Organic Supplements
- Soil Binders
- Ameliorants
- Water
WHAT IS HYDRAULIC SEEDING?

- “Hydraulic Seeding” or “Hydroseeding” is a mechanised dryland application process used in the establishment of vegetation on large, sometimes inaccessible areas where dust pollution control and environmental landscape rehabilitation are priorities.

- A mixture of selected grass seeds, fertilisers, soil binders, mulch, soil ameliorants, organic supplements and water is hydraulically sprayed onto prepared surfaces at high pressure and volume.

- The soil binders and mulch binds the surface, creating a microclimate that will permit seed germination to take place when the soils moisture and temperature conditions are favourable. Irrigation is essential in the arid regions and vegetation establishment will be visible within 3-5 days where annual grass species form part of the seed cocktail.

- A mechanised application in which vast areas can be successfully stabilised in a single operation. Areas of between two and five hectares can be completed per T 330 hydroseeding unit in a single day. The speed of this application enables an exceptionally high coverage rate to take place where dust pollution control is undertaken.
PRE REQUISITES FOR HYDRAULIC SEEDING

- A CHEMICAL ANALYSIS of the soils to be vegetated in order to accurately determine the NPK fertiliser, ameliorant & organic matter requirements.

- AMELIORATION of Areas to be vegetated with soil amendments and organic supplements as indicated by the laboratory analytical report.

- SOIL PREPARATION by creating horizontal drills or shallow furrows in which the hydraulic seeding mixture can be contained.

- SUITABLE HYDRAULIC SEEDING EQUIPMENT that is capable of uniformly dispersing the homogenously agitated (formulated) mixture.
COMPONENTS OF HYDRAULIC SEEDING

The hydraulic seeding components can consist of all or any of the following components:

- A selected **GRASS SEED** mixture, consisting of annual & perennial grass species.

- A balanced **NPK FERTILISER** ratio as determined from a laboratory soils analysis.

- A fibre **MULCH**.

- An **ORGANIC SUPPLEMENT** usually in the form of processed chicken litter, compost or other organic matter.

- A polyacrylamide **SOIL BINDER**

- A soil conditioning **AMELIORANT** such as gypsum
REQUIREMENTS

- Knowledge of the environment & soil conditions.
- An understanding of the effects of wind & soil erosion.
- A sound background to erosion control techniques to support vegetation establishment.
- A dedicated & professional team for the implementation of the work.
- THE CORRECT TOOLS OF THE TRADE.
RATIO OF VEGETATION TECHNIQUES in SOUTH AFRICA
Suitable Hydraulic Seeding Equipment

T90
T170
T330
T330 HYDROSEEDER on a Mine Site in SOUTH AFRICA
Mechanical Soil Preparation
Amelioration of Side slopes
Hydroseeding of Vast Open Areas
Hydraulic Seeding
Amelioration
Application of Organic Supplements
A Mine Waste Dump (Largest in Africa)
Accessing Restricted Areas
Mulching with Bark Blower & Hydroseeding
Hydraulic Seeding & Mulching around Major Developments
Projects To Be Reviewed
in respect of
Vegetation Establishment & Erosion Control
by
Vetiver Grass & Hydraulic Seeding

- New Sewer Works Project, Mbabane, Swaziland.
- Mogoebaskloof Mountain Pass, Limpopo Province, Republic of South Africa
This project involved erosion control and vegetation establishment to the side slopes and platforms and the disturbed areas where the pipeline ran through the Mcolo Forest Area.

- **Contract Period** - 8 months
- **Distance/Area of Vetiver Grass** - 45,000 m²
- **Hydroseeding Area** - 320,000 m²
- **Elevation variation at Mcolo** - 240 metres over 700 metres
LANDSLIP CONTROL MECHANISM BY VETIVER

Slipping zone on slopes usually 0~2 m in depth

Rows of Vetiver Grass

Vetiver Roots 1-3m deep
**VETIVER GRASS HEDGE ROW**'S  
**SLOPE & SURFACE RUN**

The figures for the surface run are based on a Vertical Interval (VI) of 1 Metre

Extracts from  
"The Hedge Against Erosion"  
World Bank,  
Washington,  
DC, USA

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Vetiver Planting Material

- Freshly harvested slips
- Potted slips
- Trimmed slips
- Freshly harvested slips
Pre-Planting Treatment with Organics

Storage ponds filled with water & organics
Preparation & planting process
Soil Preparation between Vetiver Rows
Hydroseeding after evidence of growth.
Planted Material 3-6 weeks old
Root Growth after 6-8 weeks
Vegetated Side Slope – Vetiver + hydroseeding
Sediment Control
Established Side Slopes
Established Side Slope
Pipeline - Mcolo Forest
Area Under Construction
Vetiver Planted Area
Established Pipeline Area
Established Vetiver in Rocky Area
Mcolo Forrest Area - 5 Months later
The Rehabilitation of the mountain pass after Cyclone “ELINA” deposited over 4000mm rain in under 24 hours, causing extensive damage to the existing road.

- **Length of Project**: 5.5 km
- **Duration of Projects**: 15 months
- **Elevation difference**: 550 mm
- **Area of Vetiver Grass and Hydroseeding**: 27,000 m²
- **Area of Gabion Baskets/Mattresses, Vetiver Grass + H/Seeding**: 4,300 m²
- **Area Hydroseeding only**: 26,000 m²
Erosion Damage of the Magoesbaskloof Pass, South Africa

Typical Cut Slope

Typical Fill Slope
The Rehabilitated Side Slope of the Mountain Pass

Before

After
Green Terramesh Re-constructed & Re-vegetated Fill
Gabion Baskets, Vetiver Grass + Hydroseeding
Magoebaskloof, Limpopo Province, RSA
Magoebaskloof, Northern Province, RSA
In Conclusion

Vetiver grass has many wonderful applications and is also used in phyto-remediation, waste water treatment and pest management of agricultural crops.