

UNIQUE FEATURES OF VETIVER GRASS (*Vetiveria zizanioides* L.)

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Vetiver is an erect grass with stiff stems and a very deep, extensive and penetrating root system. Although vetiver is a tropical grass, it tolerates frost as low as -20°C and also a wide range of extreme climatic conditions such as heat wave, drought, inundation, fire and adverse soil conditions, high levels of acidity, alkalinity, sodicity, magnesity. In addition vetiver tolerates elevated levels of Aluminum, Manganese, nutrients and other heavy metals. These extraordinary features make vetiver grass highly suitable for environmental protection purposes.

Special Morphological Features

Tall, erect and stiff stems



Stiff stems retard water flow in the field



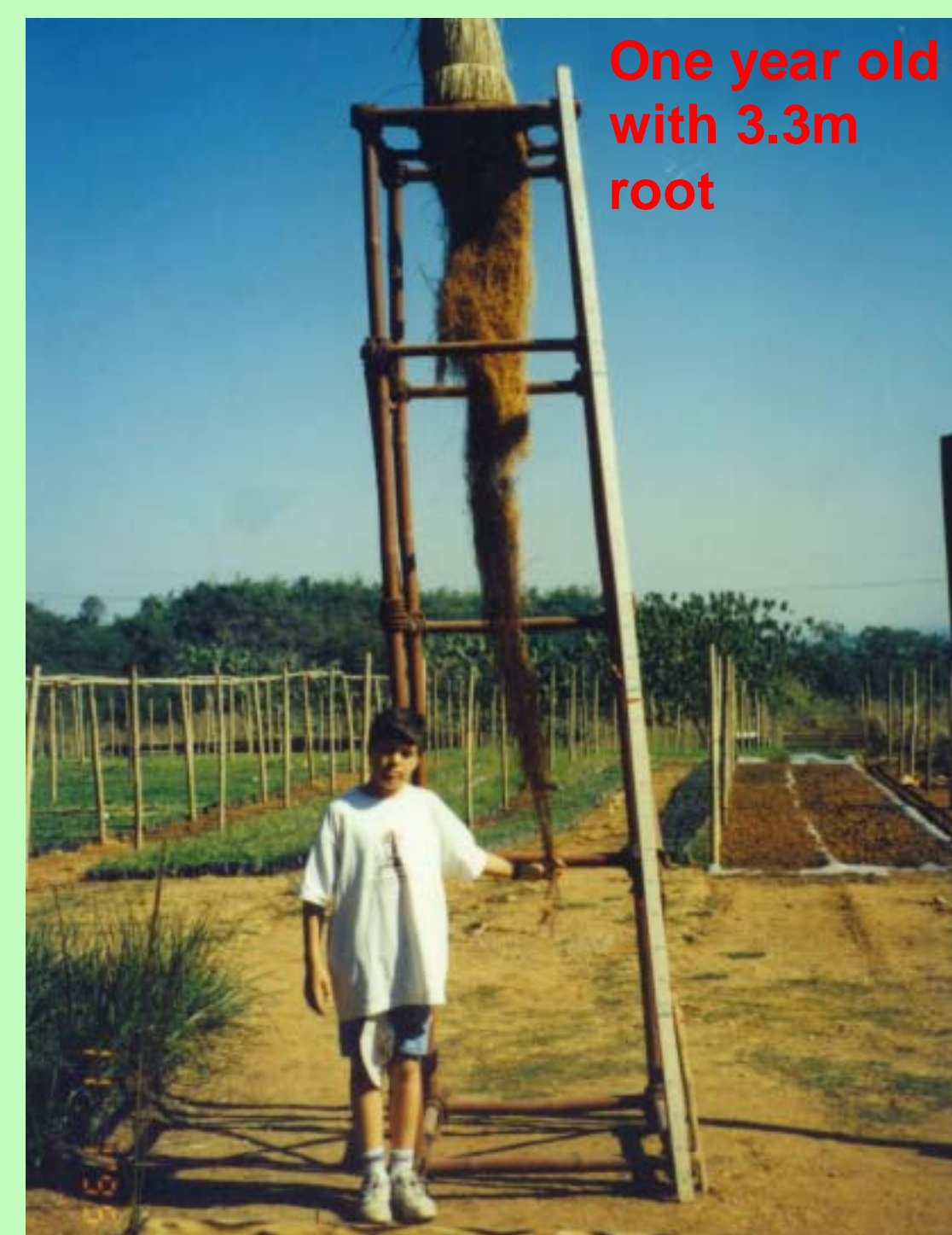
Tank test



Forming thick hedge when planted close together



Deep, extensive and penetrating root system



Root penetration equivalent to 1/6 mild steel reinforcement



Trapping both coarse and fine sediment



Extraordinary Physiological Characteristics

Tolerance range of vetiver grass

Adverse Soil Conditions	Levels (Available)
Acidity	pH 3.0
Aluminium level (Al Sat. %)	Between 80% - 87%
Manganese level	> 578 mgkg ⁻¹
Alkalinity (highly sodic)	pH 11
Salinity (50% yield reduction)	17.5 mScm ⁻¹
Salinity (survived)	47.5 mScm ⁻¹
Sodicity	48% (exchange Na)
Magnesity	2 400 mgkg ⁻¹ (Mg)
Heavy Metals	
Arsenic	100 - 250 mgkg ⁻¹
Cadmium	22 mgkg ⁻¹
Copper	174mgkg ⁻¹
Chromium	200 - 600 mgkg ⁻¹
Nickel	50 - 100 mgkg ⁻¹
Mercury	> 6 mgkg ⁻¹
Lead	>1 500 mgkg ⁻¹ (Total 3123)
Selenium	> 74 mgkg ⁻¹
Zinc	>750mgkg ⁻¹ (Total 3418)
Location	Latitude: Equator to 41 ^o Altitude: 3 000m
Climate	
Annual rainfall	250-5 000mm
Frost (Ground temperature)	-14 ^o C
Heat wave	55 ^o C
Drought (No effective rain)	15 months

Threshold Levels of Heavy Metals of Vetiver Growth as Compared with Other Species.

Heavy Metals	Thresholds to Plant Growth (mgKg ⁻¹)		Thresholds to Vetiver Growth (mgKg ⁻¹)	
	Hydroponic levels (a)	Soil levels (b)	Soil levels	Shoot levels
Arsenic	0.02-7.5	2.0	100-250	21-72
Cadmium	0.2-9.0	1.5	20-60	45-48
Copper	0.5-8.0	NA	50-100	13-15
Chromium	0.5-10.0	NA	200-600	5-18
Lead	NA	NA	>1 500	>78
Mercury	NA	NA	>6	>0.12
Nickel	0.5-2.0	7-10	100	347
Selenium	NA	2-14	>74	>11
Zinc	NA	NA	>750	880

Highly tolerant to Acid Sulfate Soils with pH as low as 3.0 and toxic levels of Al and Mn



Tolerant to waterlogging and inundation (left) and extreme drought (below)



Highly tolerant to saline conditions . Growing next to mangrove on tidal flat



Providing favourable conditions for voluntary return of native plants



Badly burnt by a very hot fire



Completely recovered 6 months later

