VETIVER SYSTEM TECHNOLOGY FOR PREVENTION AND TREATMENT OF POLLUTED WATER

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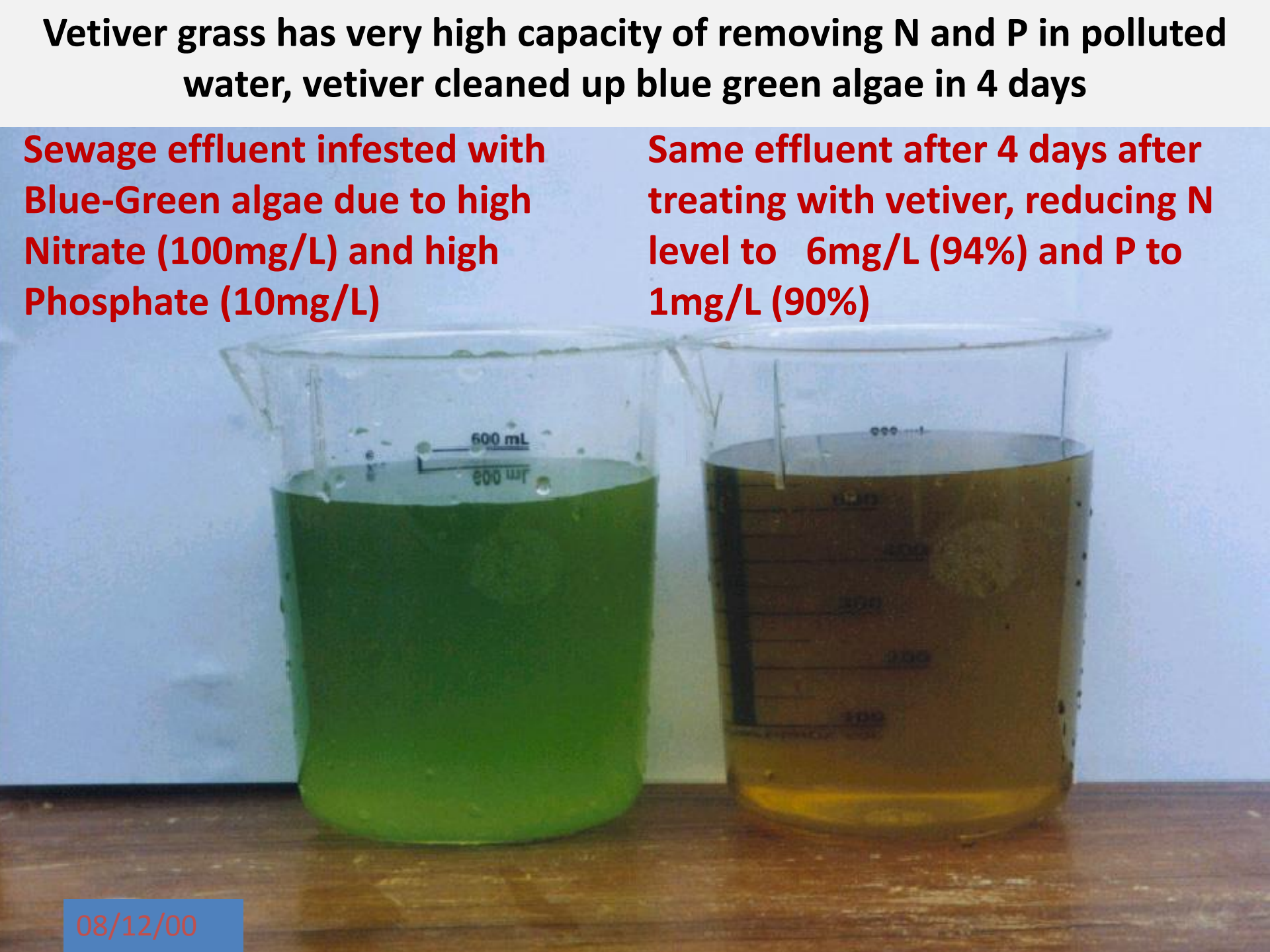
Vetiver grass has very high capacity of removing N and P in polluted water, vetiver cleaned up blue green algae in 4 days

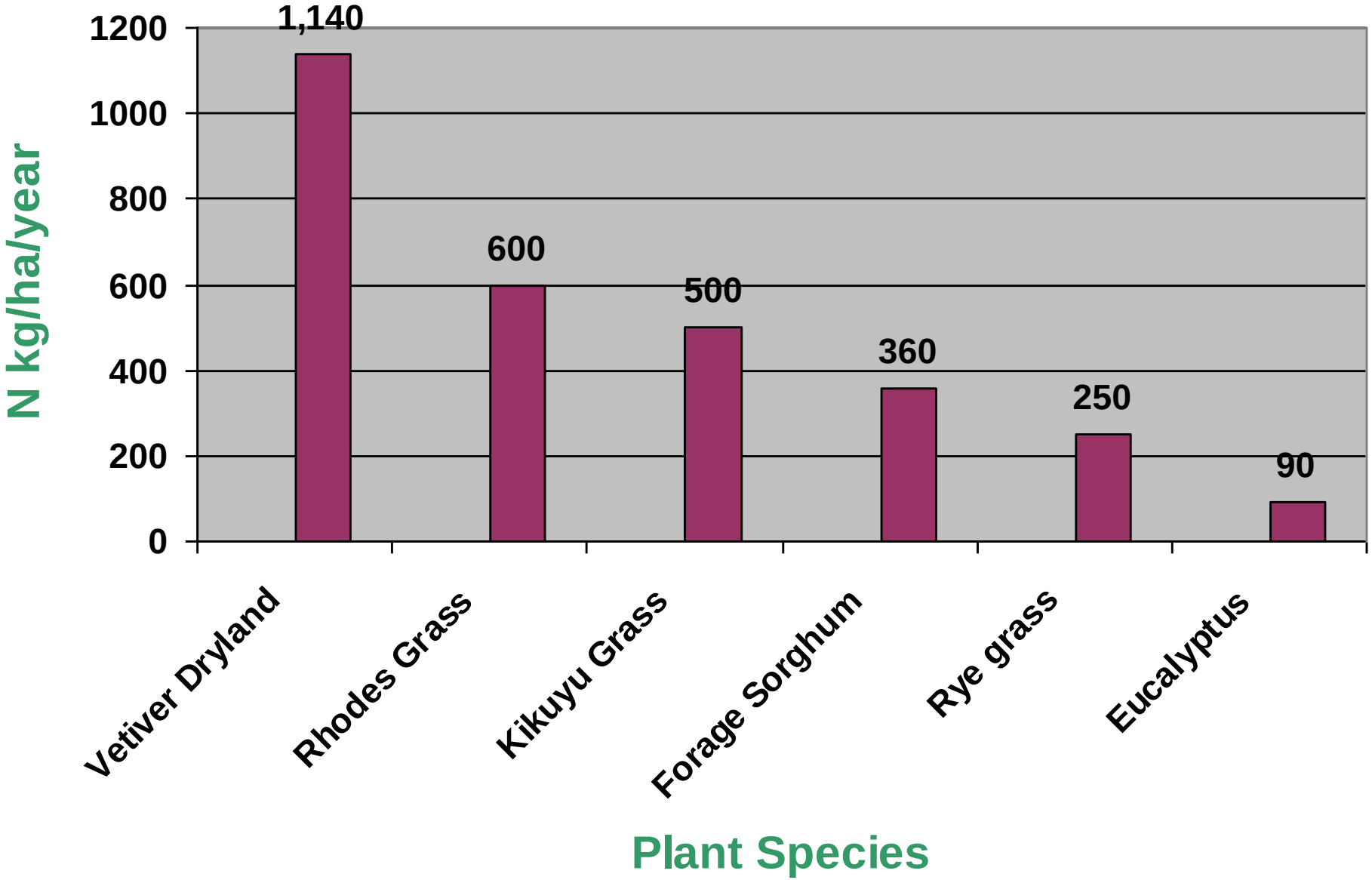
Sewage effluent infested with Blue-Green algae due to high Nitrate (100mg/L) and high Phosphate (10mg/L)

Same effluent after 4 days after treating with vetiver, reducing N level to 6mg/L (94%) and P to 1mg/L (90%)

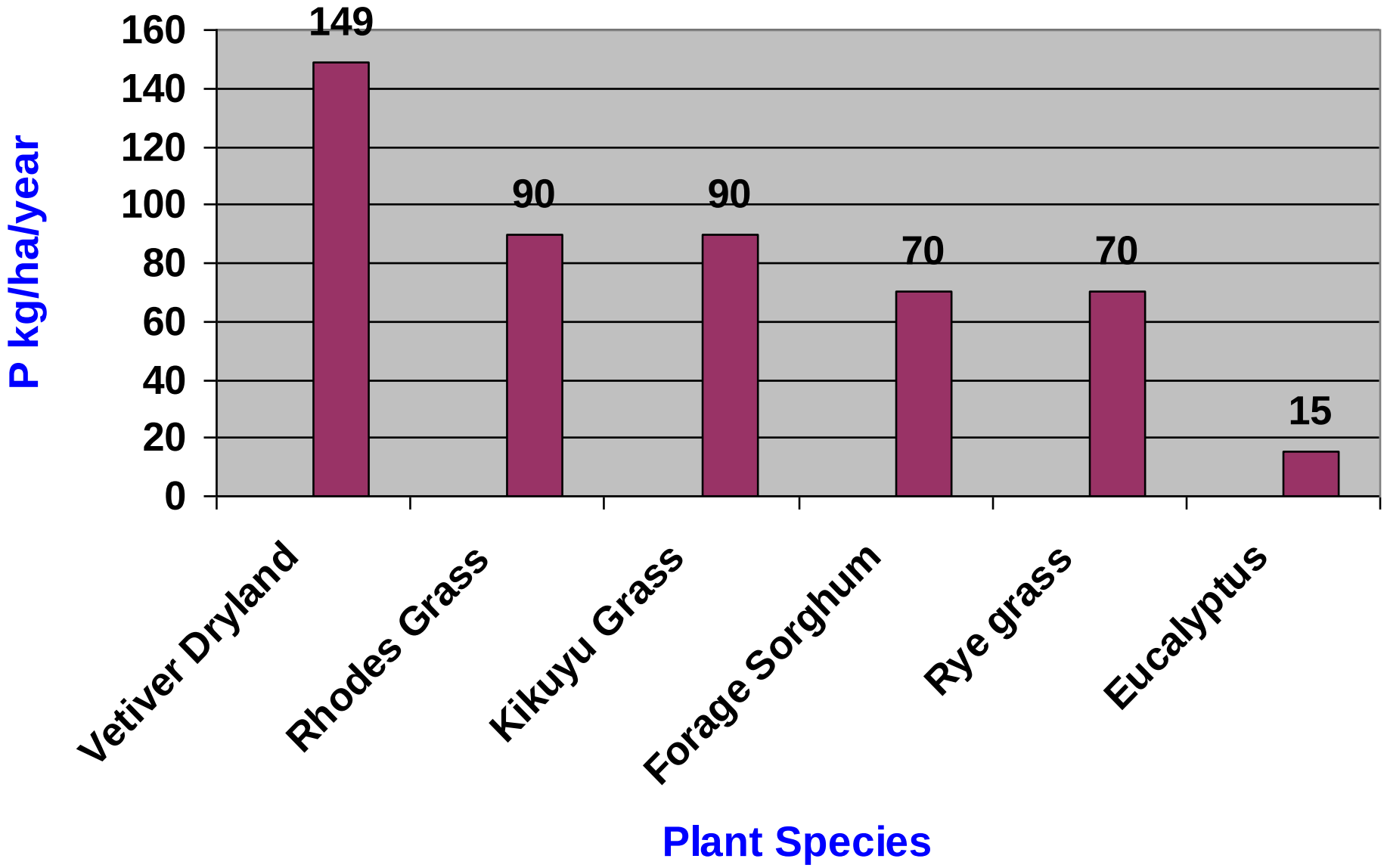


08/12/00

NITROGEN UPTAKE



PHOSPHORUS UPTAKE



CASE STUDY 1: Disposal of domestic sewage effluent

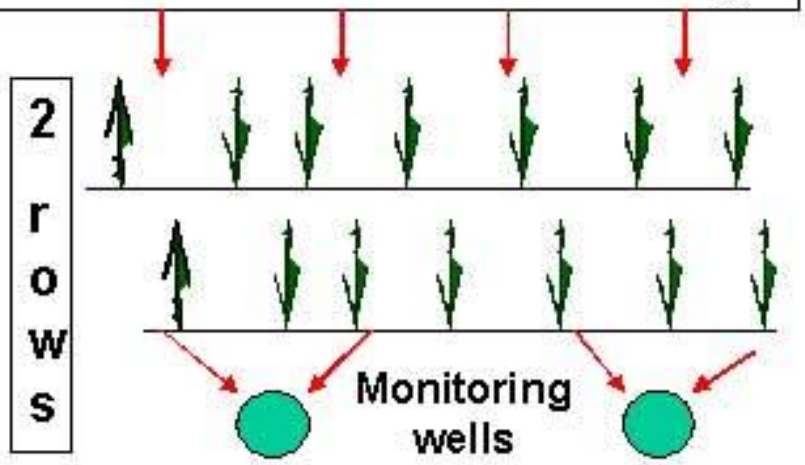
Vetiver planting to absorb effluent discharge from a toilet block in a park in Brisbane, Australia.

Six months after planting this stand of 100 plants absorbs all the discharge from the toilet block

High capacity for N absorption in domestic sewage in Australia

Effectiveness of Vetiver in Reducing N in domestic sewage

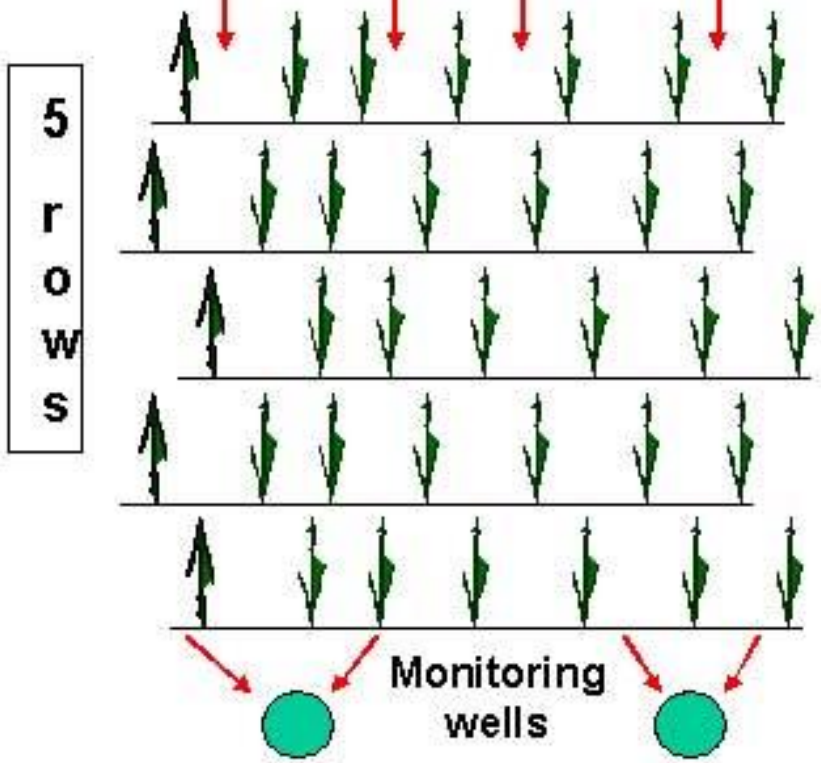
ENTRY: Total N level at 95.2mg/L



EXIT: Total N level at 16mg/L

or a reduction of 83%

ENTRY: Total N level at 95.2mg/L

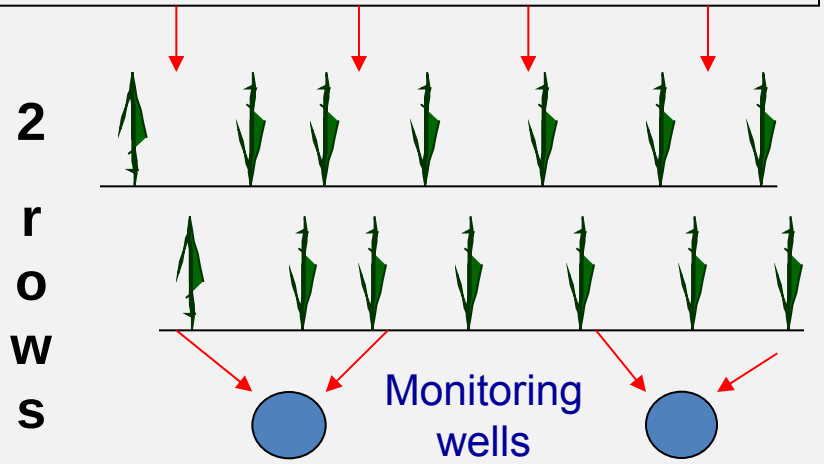


EXIT Total N level at 1.2mg/L

or a reduction of 99%

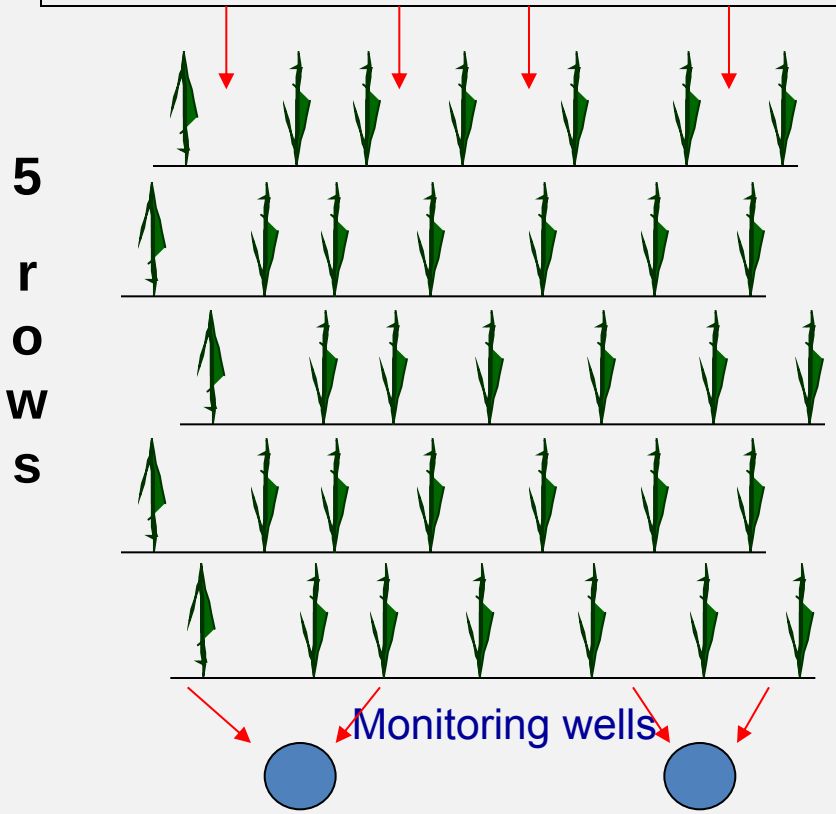
High capacity for P absorption in domestic sewage in Australia

Entry: **Total P level at 1.3mg/L**



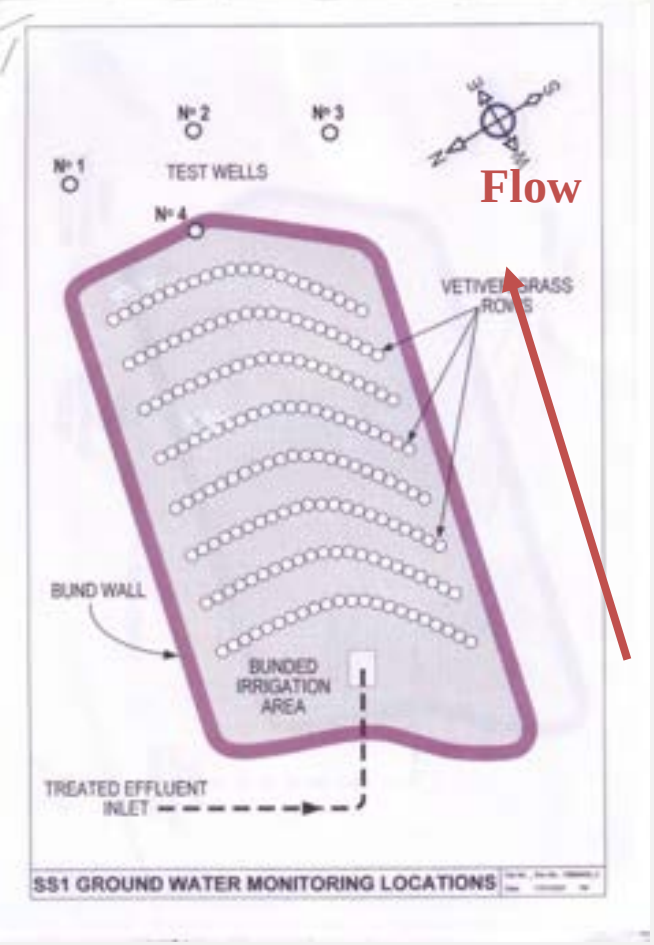
Exit: **Total P level at 0.24mg/L**
or a reduction of 82%

Entry: **Total P level at 1.3mg/L**



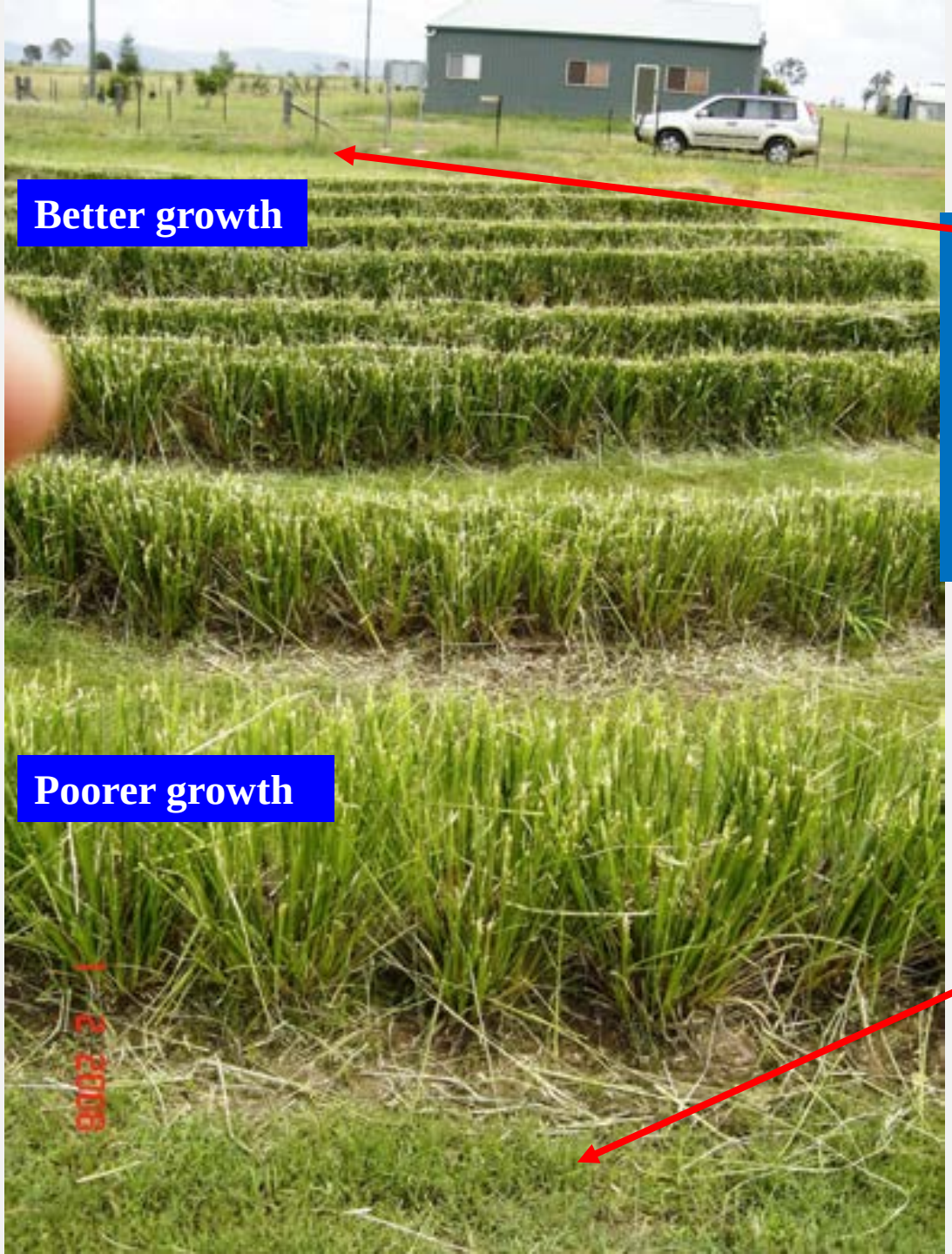
Exit: **Total P level at 0.20mg/L**
or a reduction of 85%

CASE STUDY 2: Disposal of sewage effluent a small community



- 8 rows of 10m long vetiver
- Row spacing 1m
- Plant spacing 20cm
- Total plants 400
- Land area 100 sqm

RESULTS



IN FLOW

Average daily flow: 1 670L

Average total N: 68mg/L

Average total P: 10.6mg/L

Average Faecal Coliform:>8 000

OUT FLOW

Average daily flow: Almost Nil*

Average total N: 0.13mg/L

Average total P: 0.152mg/L

Average Faecal Coliform:<10

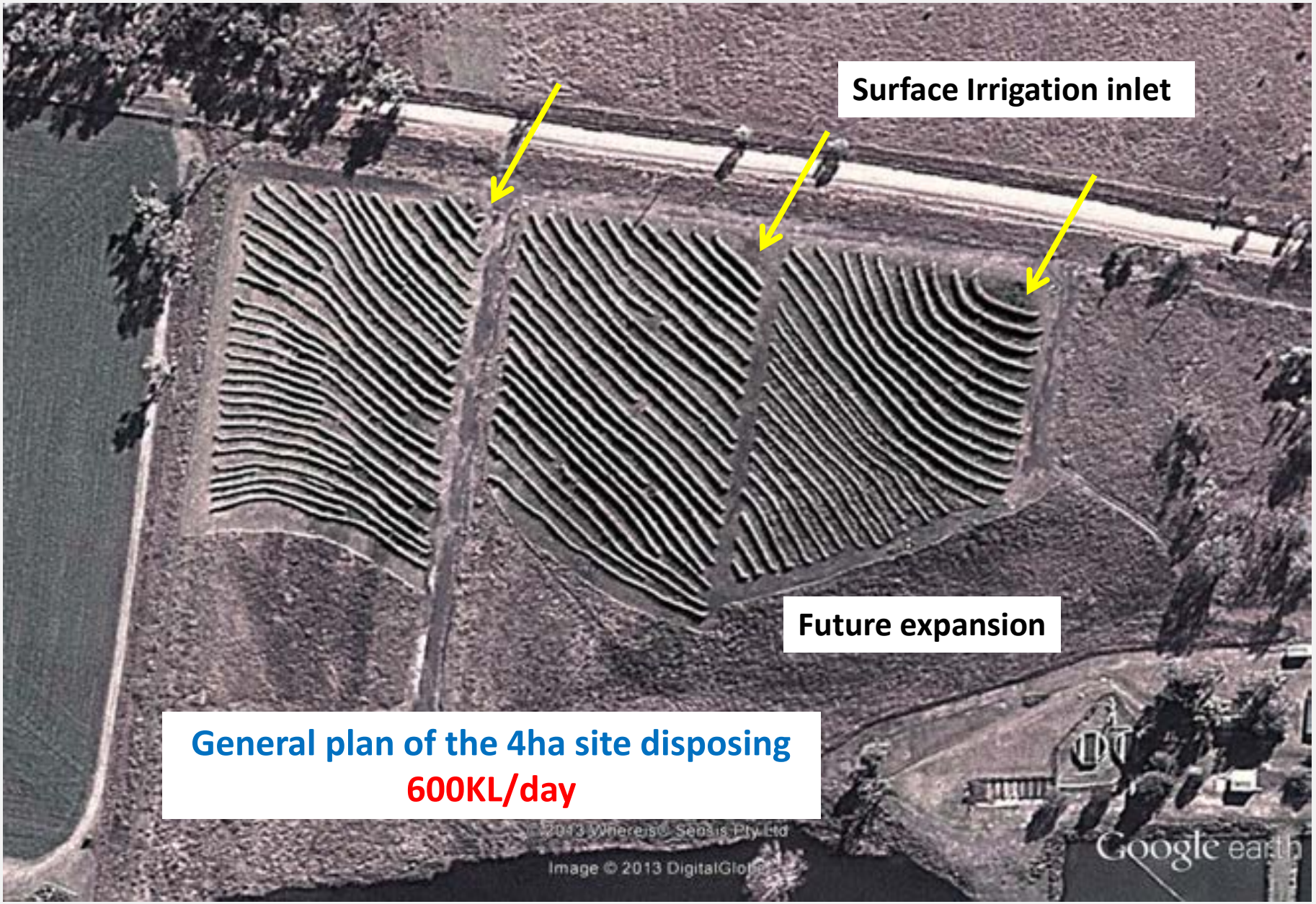
* Only flow after heavy rain

CASE STUDY 3: Ephemeral Wetland treatment of municipal sewage effluent

Effluent quality before and after the vetiver treatment

Tests * (license requirements)	Effluent Input	Effluent Output
PH (6.5 to 8.5)8*	7.3 to 8.0	7.6 to 9.2
Dissolved Oxygen (2.0 minimum) *	0 to 2 mg/l	8.1 to 9.2 mg/l
5 Day BOD (20 - 40 mg/l max) *	130 to 300 mg/l	7 to 11 mg/l
Suspended Solids (30 - 60 mg/l max) *	200 to 500 mg/l	11 to 16 mg/l
Total Nitrogen (6.0 mg/l max) *	30 to 80 mg/l	4.1 to 5.7 mg/l
Total Phosphorous (3.0 mg/l max) *	10 to 20 mg/l	1.4 to 3.3 mg/l

CASE STUDY 4: Disposal of municipal sewage effluent by land irrigation in Australia



Six month old

12 month old

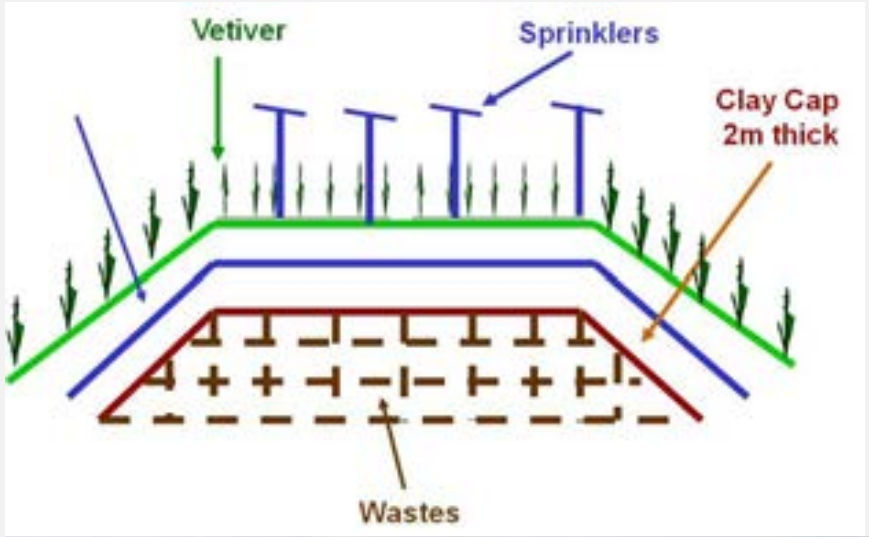
Six month old

This planting has totally disposed 500-600KL/day

12 month old

CASE STUDY 5: Disposal of municipal landfill leachate in Australia

Spray irrigation on landfill mound: the diagrammatic cross section of the mound (top left), vetiver irrigated every day with leachate after planting (top right), two (bottom left) and twelve (bottom right) months after planting.



Vetiver growth was over 3m in the second summer

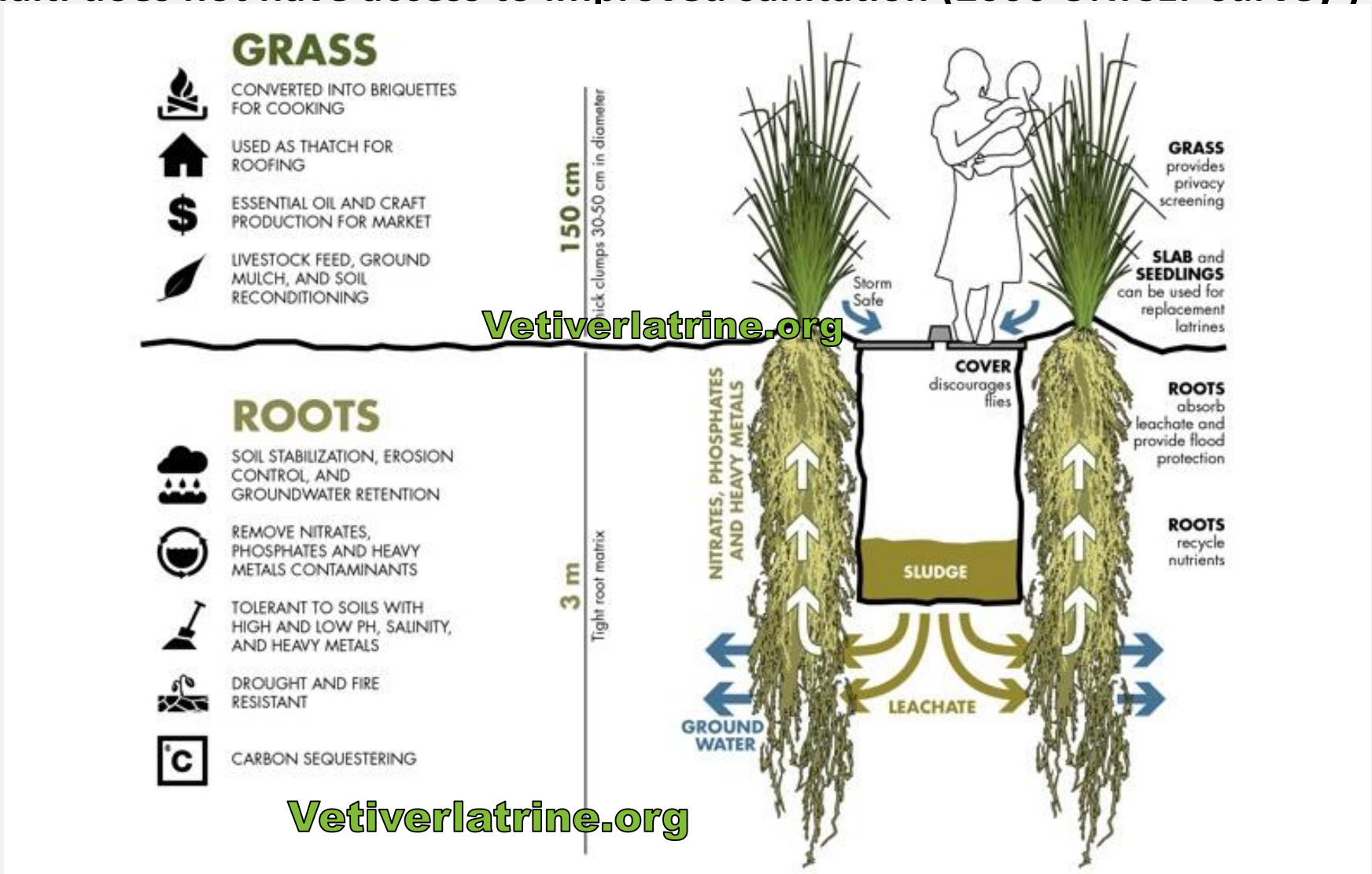
Growing in highly saline and polluted leachate pool

Fresh leachate pool

Twelve months after planting, the 3.5ha site disposing 4 ML/month

CASE STUDY 6: Vetiver Latrine in Haiti

Applying the Vetiver Phytoremediation Technology, Owen Lee (Vetiverlatrine.org) developed the Vetiver Latrine for Haiti, where 88% of rural Haiti does not have access to improved sanitation (2006 UNICEF survey)



Rural Haiti Environment

- Remote and difficult to access
- Very vulnerable community with few economic sources
- Heavily affected by Cholera without sanitation
- Vetiver Latrine provides a storm proof, environmentally friendly privacy screen
- It can treat the leachate and reduce the potential of spreading water borne pathogens
- 116 latrines constructed by the community so far, covering 97% in 3 villages
- Next phase: 250 households to complete sanitation coverage in the Pincroix area
- Measurement of environmental impact and usage
- Promotion of the vetiver latrine

Hydroponic treatment of pig farm effluent

Thank You