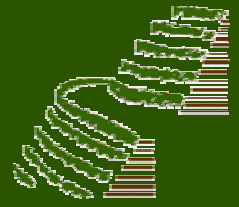
MONTO VETIVER GRASS
for
WETLAND CONSTRUCTION



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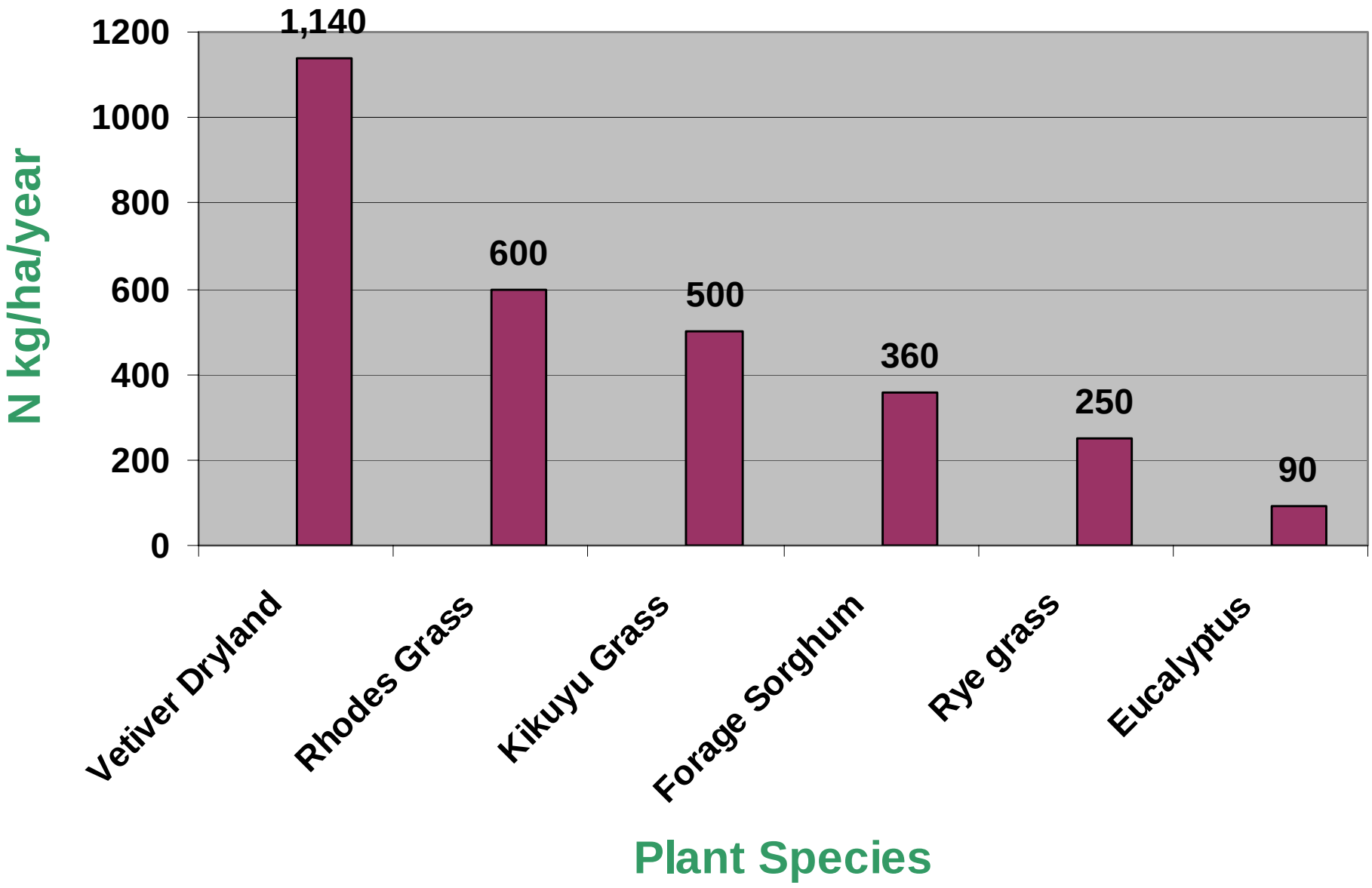
SPECIAL PHYSIOLOGICAL CHARACTERISTICS

- **Tolerant high levels of herbicides and pesticides**

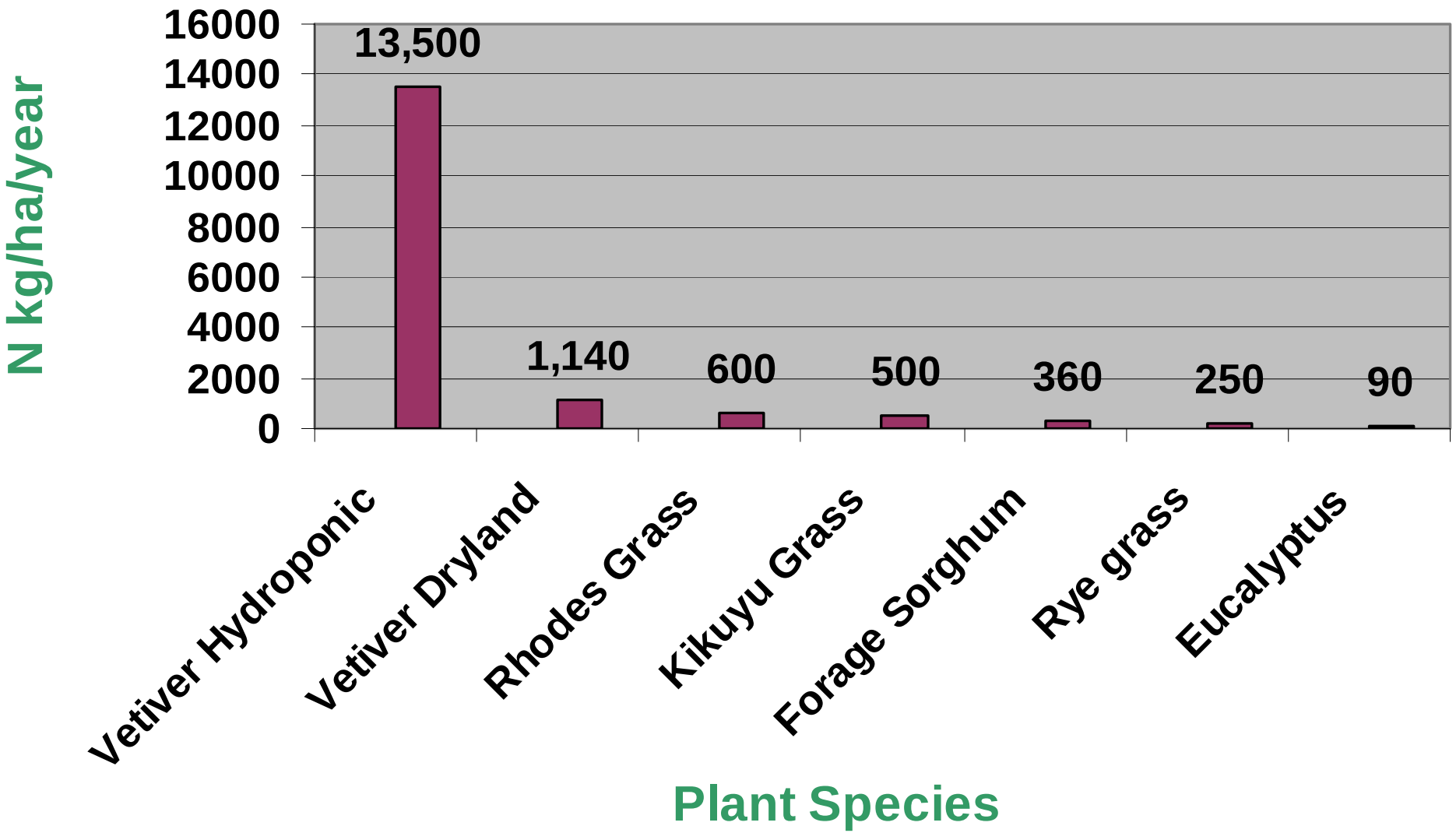
- **Fast growing with very high water consumption**

- **Very high capacity for N and P uptake under Dryland, Wetland or Hydroponic conditions**

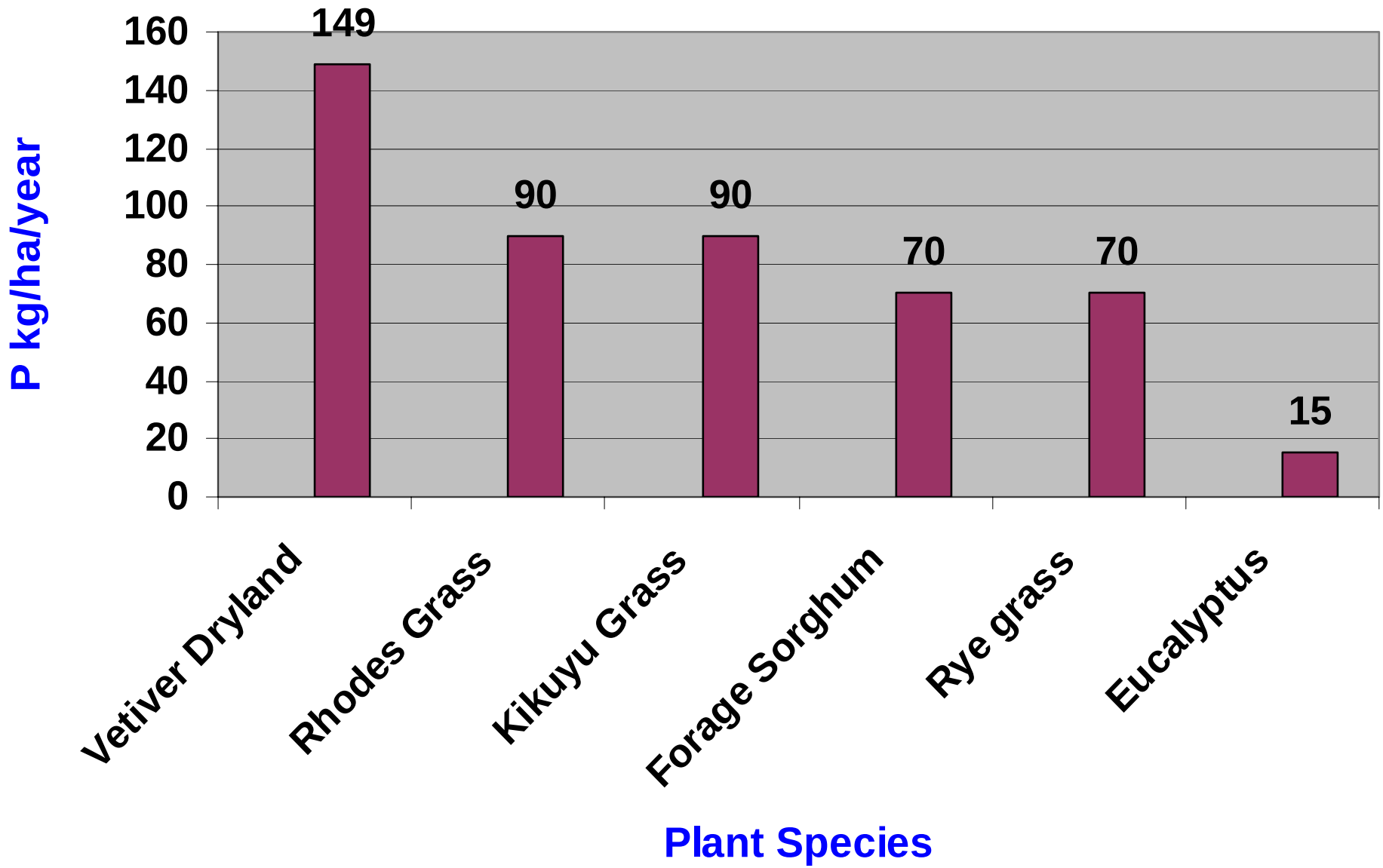
NITROGEN UPTAKE



NITROGEN UPTAKE



PHOSPHORUS UPTAKE



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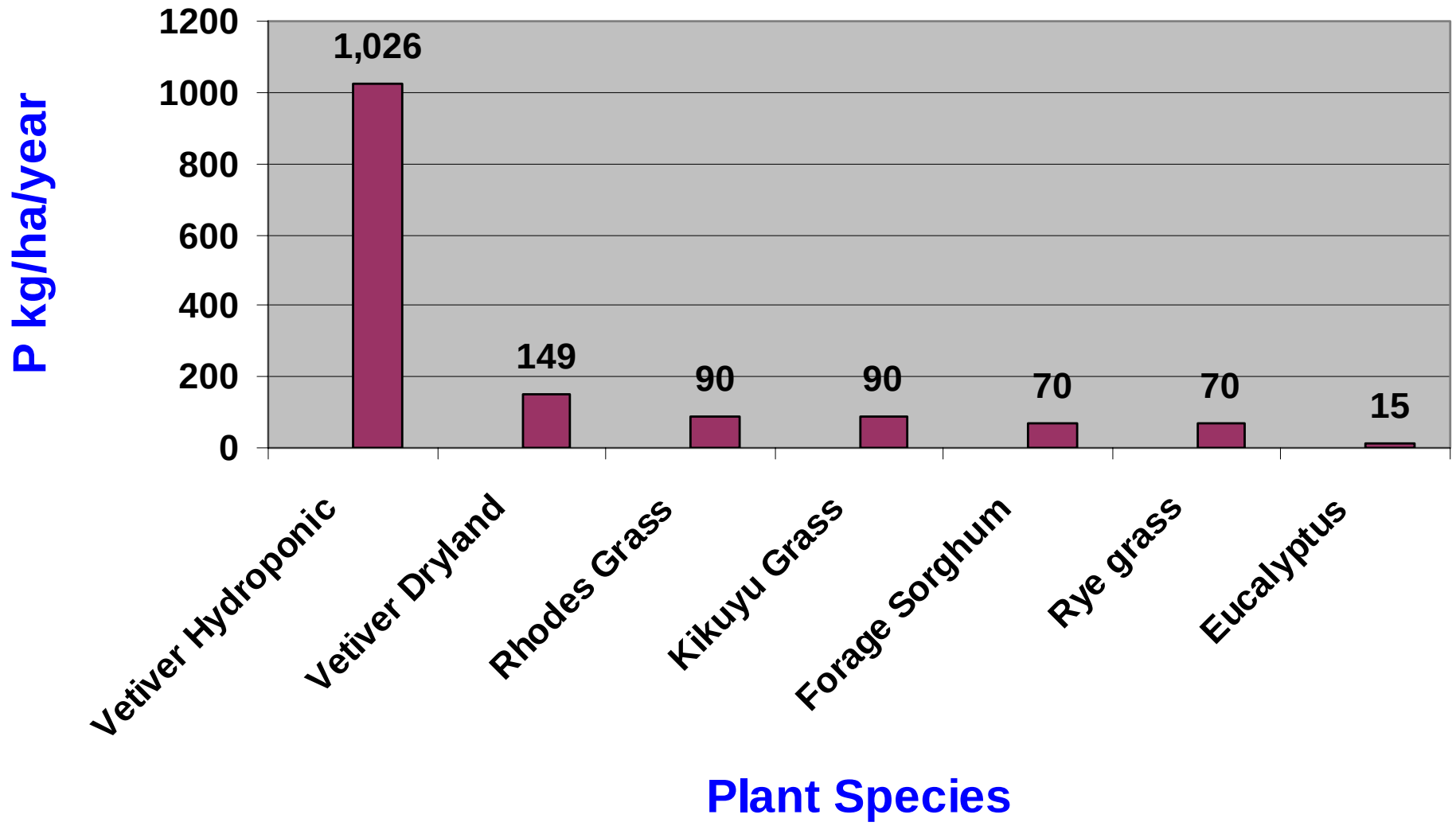


ABSORBING POLLUTANT: Much higher capacity for N and P absorption as compared with other plants

Plant species	Nitrogen (kg/ha/year)	Phosphorus (kg/ha/year)
Vetiver hydroponic	13,688	1,026
Vetiver pot trials	2,040	153
Vetiver field trial	1,142	149
Rhodes grass	600	90
Kikuyu	500	90
Green Panic	430	70
Forage sorghum	360	70
Bermuda grass	280	30-35
Eucalypts trees	90	15
Rye grass	200-280	60-80
Wheat (6)	23-208	3-27

WETLAND RESEARCH AND CONSTRUCTION

RESULTS OF WETLAND RESEARCH IN QUEENSLAND

- **Vetiver used more water than other common wetland plants such as Typha, Phragmites and Schoenoplectus.**
- **Vetiver used approximately 7.5 times more water than Typha.**
- **Total water use for a period of 14 days was approximately 2.4 litres per pot containing a single plant.**
- **Water use by vetiver grass was not affected by exposure to either Diuron or Atrazine at concentrations up to 2000 μg/L, levels which are likely to occur only in situations of accidental spillage or direct application to waterways.**

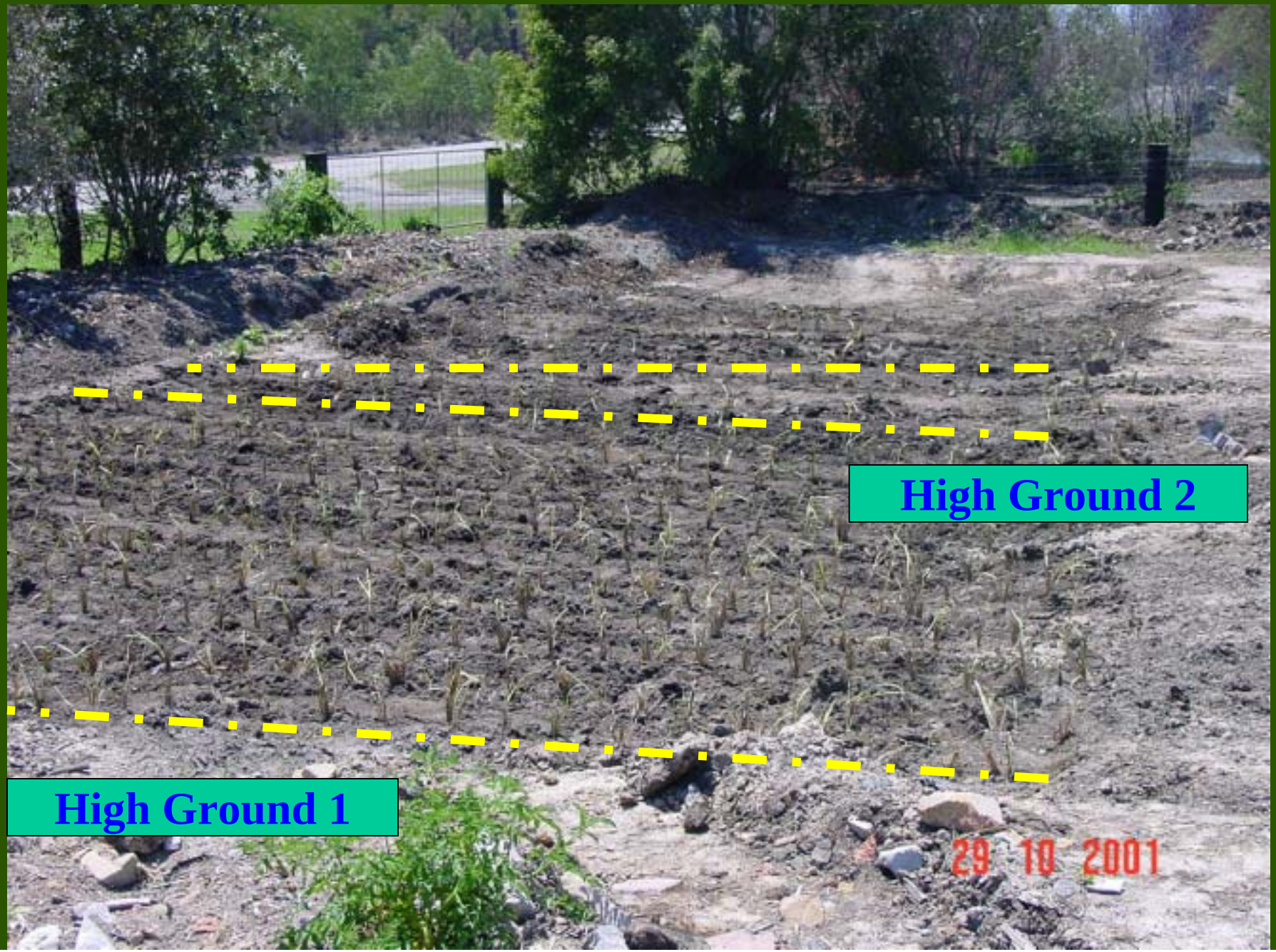
CONVENTIONAL WETLAND

- **Young vetiver does not thrive under flooded conditions**
- **Mature vetiver grows better in shallow water**
- **This problem can be overcome by:**

- using mature plants or

- establish vetiver first before flooding

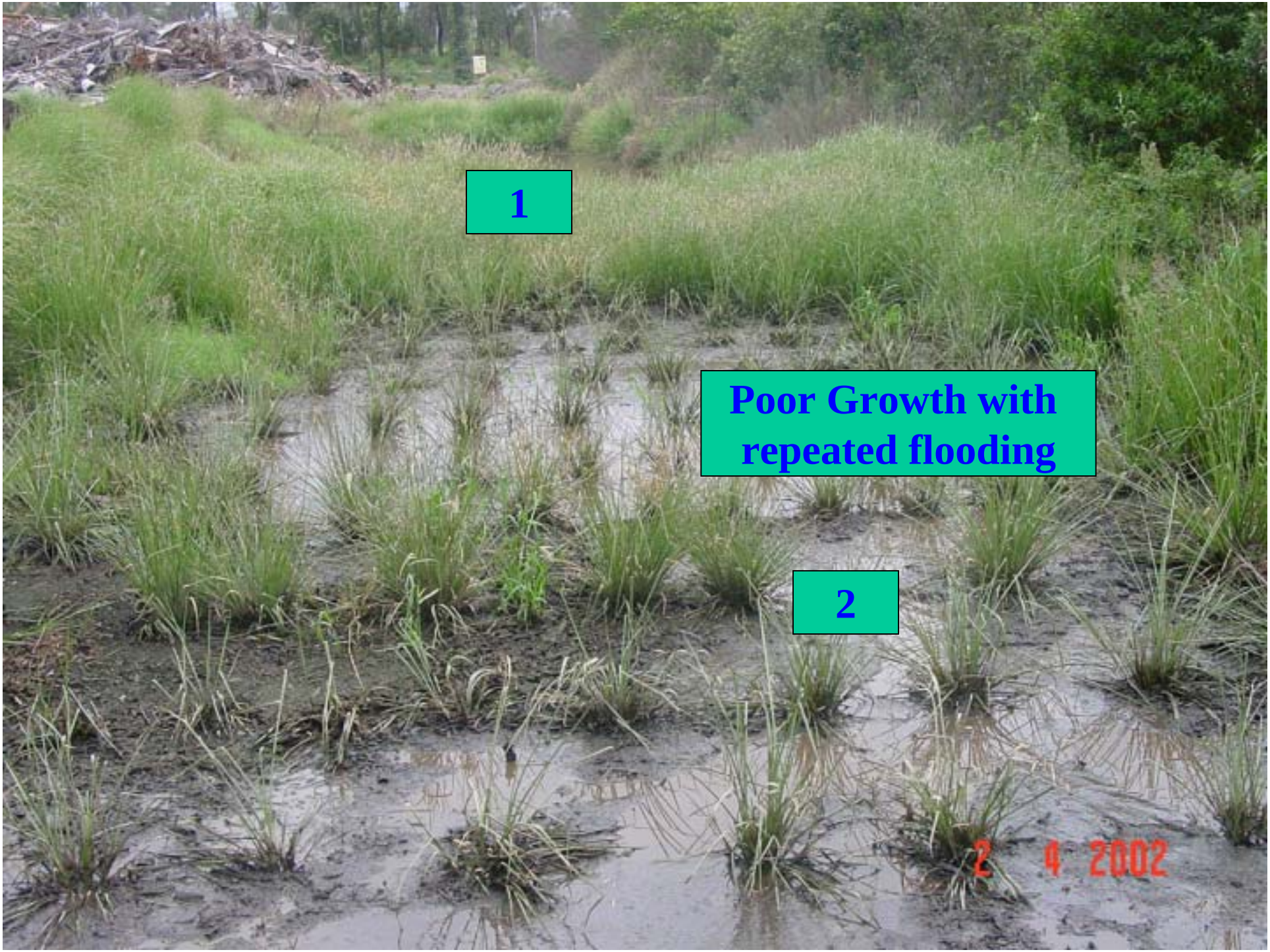
Constructed wetland at Superior Soil at Yatala




1
2
11 12 2001


2
1
11 12 2001


1
Poor Growth with repeated flooding
2
15 2 2002


1
Poor Growth with repeated flooding
2
2 4 2002


2
1
10 5 2002


1
Vetiver was eventually overgrown by weeds
2
7 11 2002


1
7 11 2002

Mature plants trial

Six weeks later

Beaudesert, Queensland

One year after planting

Vetiver in a wetland in China

Wetland in Guangzhou, southern China


8 10 2003


8 10 2003

Six month old
under hydroponic
conditions

Twelve month old
under hydroponic
conditions

CYCLIC WETLAND

A wetland system specially designed to treat sewage effluent form a small country town,Toogoolawah, Esk Shire, Queensland

- **The effluent N loading is at 13mg/L and 5.5mg/L for P; and daily discharge is 0.5ML.**
- **These loadings exceed the standards set out by the ANZECC of 10mg/L for N and 1mg/L for P.**

Treatment Strategy

- **Pre treating effluent in storage pond with vetiver pontoons and pond edges**
- **Vetiver Semi Wetland to treat the main body of effluent to ANZECC recommended level of 10mg/L for N and 1mg/L for P.**


22 5 2003

Vetiver roots thrive in high N and P sewage effluent and polluted water

Bare storage pond edges is ideal for vetiver planting to reduce both volume and nutrient loads of effluent

Six months after planting

Vetiver planting for effluent treatment also controls weeds


21 1 2004


3 2 2004


3 2 2004

Treatment Strategy

- **Vetiver Cyclic Wetlands to treat the main body of effluent to ANZECC recommended level of 10mg/L for N and 1mg/L for P.**

Wetland site preparation: Grazing land

Planting on contour lines at 6 plants/m and space in between lines at 5 plants/m2


13 2 2003

Two months after planting

Three months after planting

Ten months after planting

Ten months after planting, left half

Ten months after planting, right half


21 1 2004


3 2 2004


21 1 2004


Toogoolawah, Queensland-
March 2 2021 - 18 years
after establishing in 2003

TEST RESULTS OF SEWERAGE EFFLUENT

(Licence Requirements in Brackets)

Tests	Plant Influent	Previous Results 2002/03	New Results (Effluent) 2004
PH (6.5 to 8.5)	7.3 to 8.0	9.0 to 10.0	7.6 to 9.2
D. Oxygen (2.0 minimum)	0 to 2 mg/L	12.5 to 20 mg/L	8.1 to 9.2 mg/L
5 Day BOD (20 - 40 mg/l max)	130 to 300 mg/L	29 to 70 mg/L	7 to 11 mg/L
Suspended Solids (30 - 60 mg/l max)	200 to 500 mg/L	45 to 140 mg/l	11 to 16 mg/l
Total Nitrogen (6.0 mg/l max)	30 to 80 mg/L	13 to 20 mg/L	4.1 to 5.7 mg/L
Total Phosphorous (3.0 mg/l max)	10 to 20 mg/L	4.6 to 8.8 mg/L	1.4 to 3.3 mg/L

Cyclic Wetland Management

- **The difference between conventional and cyclic wetland is in its operation, the cyclic wetland is allowed to dry out between flooding.**
- **At Toogoolawah the cycle is 2 day flooding and 2-3 day drying. This operation maximizes vetiver growth, hence nutrient removal**
- **The major advantage of this system is that vetiver can be harvested and removed, ie nutrients are exported from the wetland. Whereas under conventional wetland nutrients can not be exported and gradually built up.**

Treating piggery effluent

Thank You