

WP6

Environmental Impact Assessment and Life Cycle Analysis of kenaf production and use

Partners

UniNOVA, Portugal (7)

INRA, France (11)

Start month: 12th – 1st March 2004

End month: 30th – 31st May 2006

Energy crops



+ Renewable Sources of Energy

+ Use of set aside land or derelict land



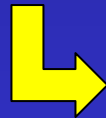
Limiting erosion risks

+ Positive Carbon Balance



Reduction of greenhouse gas emissions

+ Low sulphur content



Reduction of acidifying gas emissions

Land intensive
(monoculture)



Water pollution (NO_3^- , PO_4^{3-} , pesticides)



Danger of reducing
the Biodiversity

Ecological criteria to be considered

- Net avoided use of fossil energy
- Net avoided emission of greenhouse gases
- Net emission of acidifying gases
- Emission of ozone depleting gases
- Emission of nitrogen and other nutrients/minerals to soil and water
- Emission of pesticides
- Erosion
- Groundwater depletion
- Use of resources
- Waste production and utilisation

Energy Balance

$$\text{Net Energy Gain} = \text{Energy Output} - \text{Energy Input}$$

The diagram illustrates the components of the energy balance equation. An arrow points from 'Energy Output' to a calculation: 'Productivity x Gross Heat of Combustion'. Another arrow points from 'Energy Input' to a list of inputs: 'Production of Seeds', 'Fertilisers', 'Pesticides', and 'Machinery'.

Energy Output components:
Productivity
x
Gross Heat of Combustion

Energy Input components:
Production of Seeds
Fertilisers
Pesticides
Machinery

Monte de Caparica, Portugal results

Energy Input

N-fertilizer – 0.0386 GJ/kg

P-fertiliser – 0.0076 GJ/kg

K-fertiliser – 0.003 GJ/kg

Seed - 1 GJ/ha (20 plants/m²)
2 GJ/ha (40plants/m²)

Machinery – 8.7 GJ/ha

S1

=

S2

= 13.1 GJ/ha

V1

=

V2

= 13.1 GJ/ha

I0

=

I25

=

I50

=

I100

= 13.1 GJ/ha

D1

<

D2

13.1 GJ/ha

14.1 GJ/ha

N0

<

N75

<

N150

10.2 GJ/ha

13.1 GJ/ha

16.0 GJ/ha

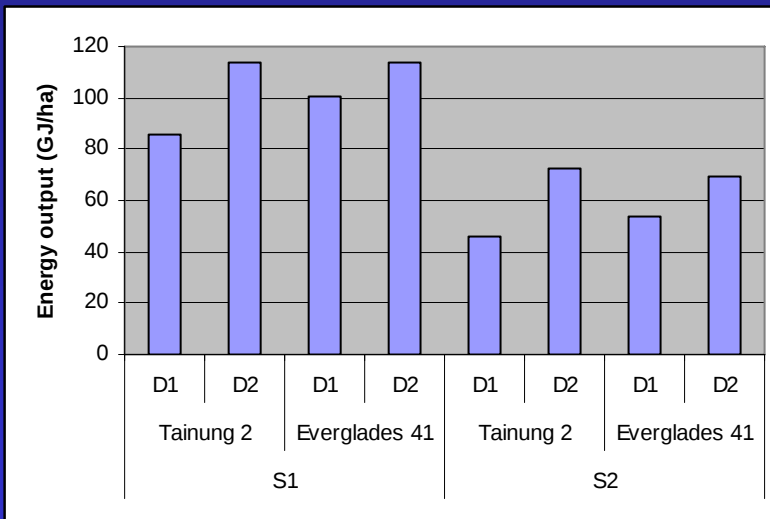
Monte de Caparica, Portugal results

Energy Output

Productivity x Gross Heat of Combustion

S1 > S2

I0 < I25 < I50 < I100



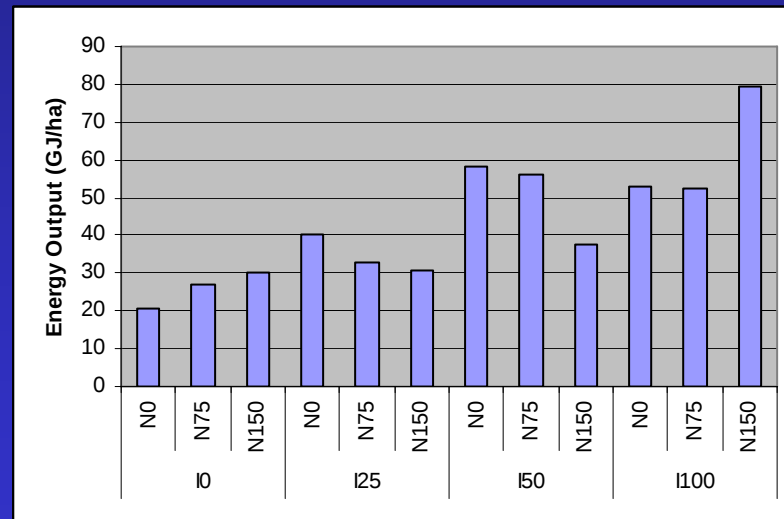
S1 > S2

D2 > D1

Everglades 41 > Tainung 2

S1 > S2

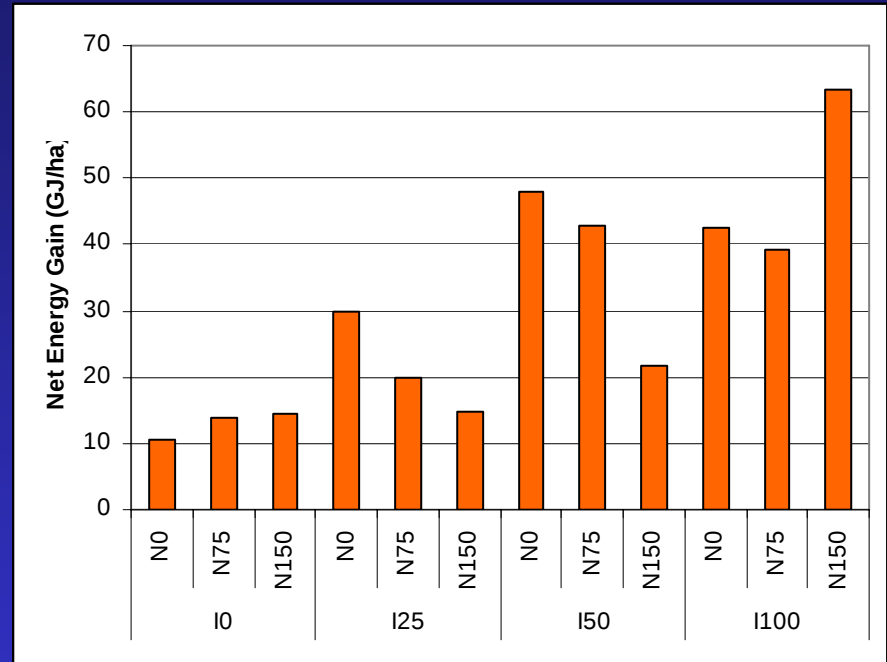
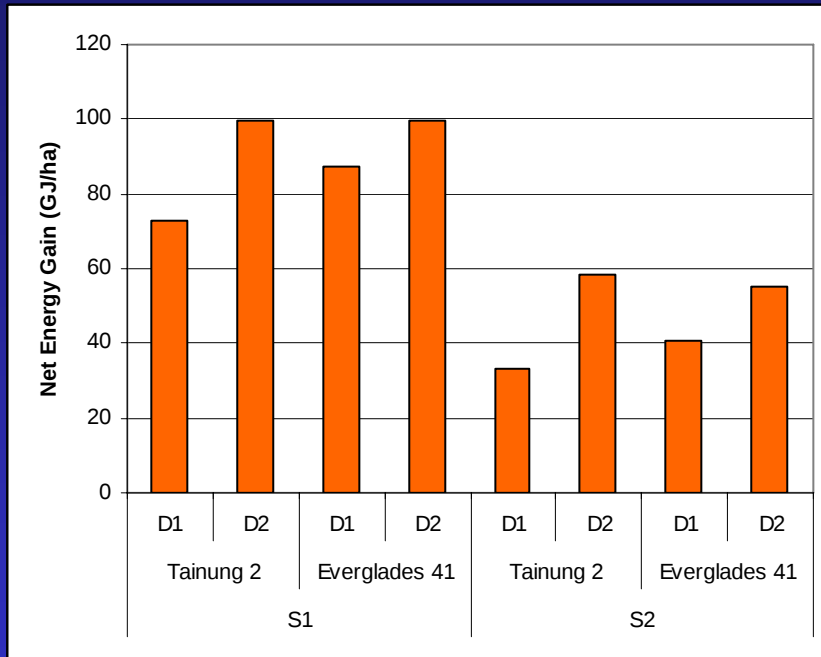
Everglades 41 > Tainung 2



I0 < I25 < I50 < I100

Monte de Caparica, Portugal results

Net Energy Gain



S1 > S2

D2 > D1

Everglades 41 > Tainung 2

I0 < I25 < I50 < I100