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: 39th – 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

Aim of the Work:

To compare the ecological sustainability of production and use of kenaf in southern European regions

To compare the ecological sustainability of kenaf in southern European regions with the sustainability of other crops and of other energy sources

Milestones:

-Environmental impact assessment covering the whole production chain of kenaf

-Life cycle analysis considering the potential of kenaf as a biofuel for thermochemical conversion processes (combustion, gasification, pyrolisis). LFA considering other uses, can also be studied.

-Scenarios for alternative land use in agriculture regions of south EU.

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

Net Energy Gain = **Energy Output** - **Energy Input**

Energy Output

Productivity
x
Gross Heat of Combustion

Energy Input

Production of Seeds
Fertilisers
Pesticides

Machinery

Partners should provide: productivity data

Emission of Greenhouse Gases

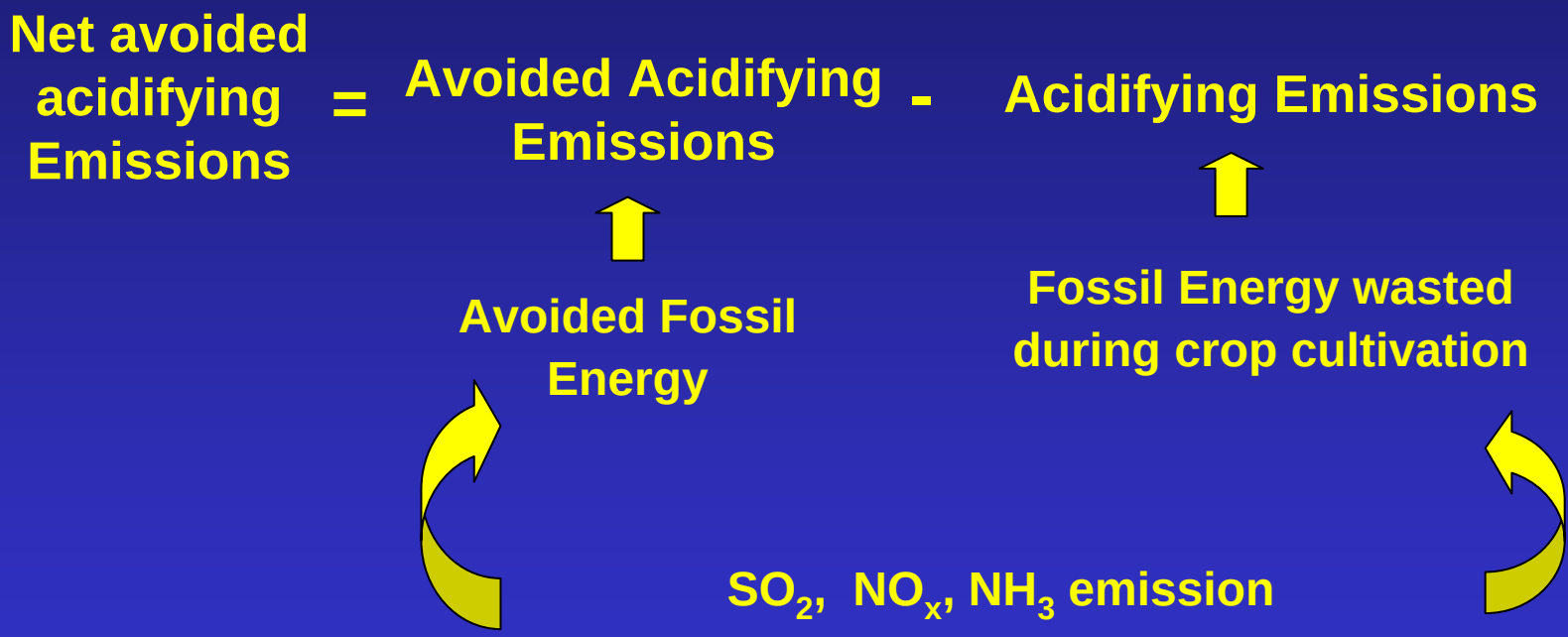
Net Avoided Emissions of Greenhouse Gases = **Avoided CO_2 Emissions** - **N_2O Emissions**

Avoided CO_2 Emissions = **CO_2 immobilised in the plants** - **CO_2 emissions caused by agronomic inputs**

application of factors

Contributes also for the emission of ozone depleting gases

Emission of acidifying Gases



Emission of Minerals to Soil and Water

N, P, K Surpluses = N, P, K output - N, P, K input

Productivity x Mineral content

Fertilisers
Air Deposition
NH_3 Volatilisation

Partners should provide: productivity data
N, P and K crop outputs
N, P, K soil data at harvest (if possible, not mandatory)

Emission of pesticides

– partners should provide information on the amount of pesticides per group (herbicides, fungicides, insecticides and other pesticides) that is used

- scores of harmfulness of the several applications are applied

- total score on pesticides is calculated, indirect effects are analysed

Soil Erosion

→ Soil covered by leaves, stems and roots -
- division of the crop growth into stages

→ Rainfall

Harmful Rainfall

Partners should provide: rainfall (mm)

Groundwater depletion

Information collected along the project concerning

- water use of the crop during its growth
- additional water use caused by irrigation

Use of Resources

Information collected concerning

- exhaustion of fossil energy
- exhaustion of fertilizer ores (K and P)

Waste production and utilization

- possible uptake of contaminants
- possible formation of ashes and if they are dumped, particularly when considering the gasification or combustion conversion processes
- reuse of residual materials

- Contribution to biodiversity
- Contribution to landscape values

should also be considered