Some Aspects of the Environmental Impact Assessment of Kenaf production

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Ecological criteria to be considered

- Energy budget
- Emission of greenhouse gases
- Emission of acidifying gases
- Emission of ozone depleting gases
- Emission of minerals to soil and water
- Emission of pesticides
- Erosion
- Groundwater depletion
- Use of resources
- Waste production and utilization
- Contribution to biodiversity
- Contribution to landscape values
- Other criteria

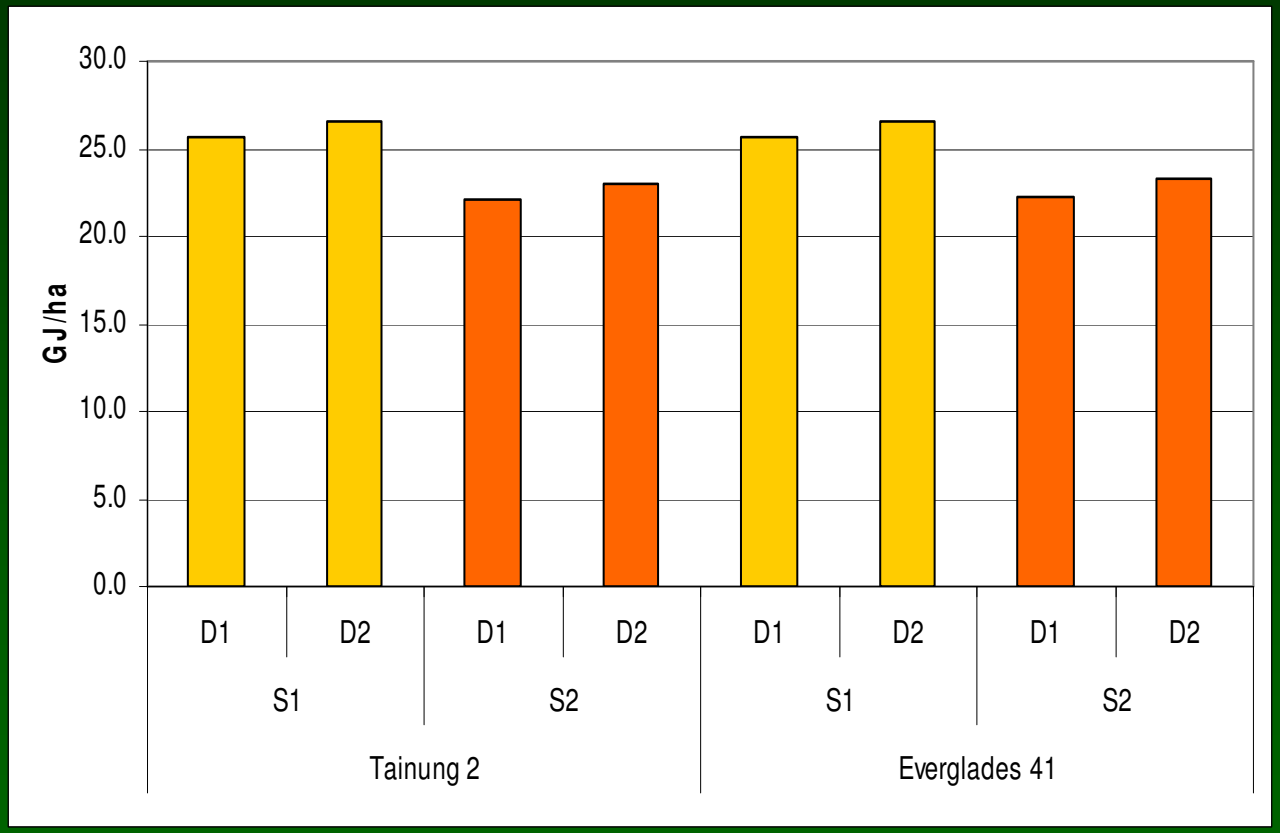
Socio-economic criteria to be considered

- Costs of energy produced or costs of the product produced
- Costs of abated CO_2 emission
- Employment creation

Energy input in the Production phase:

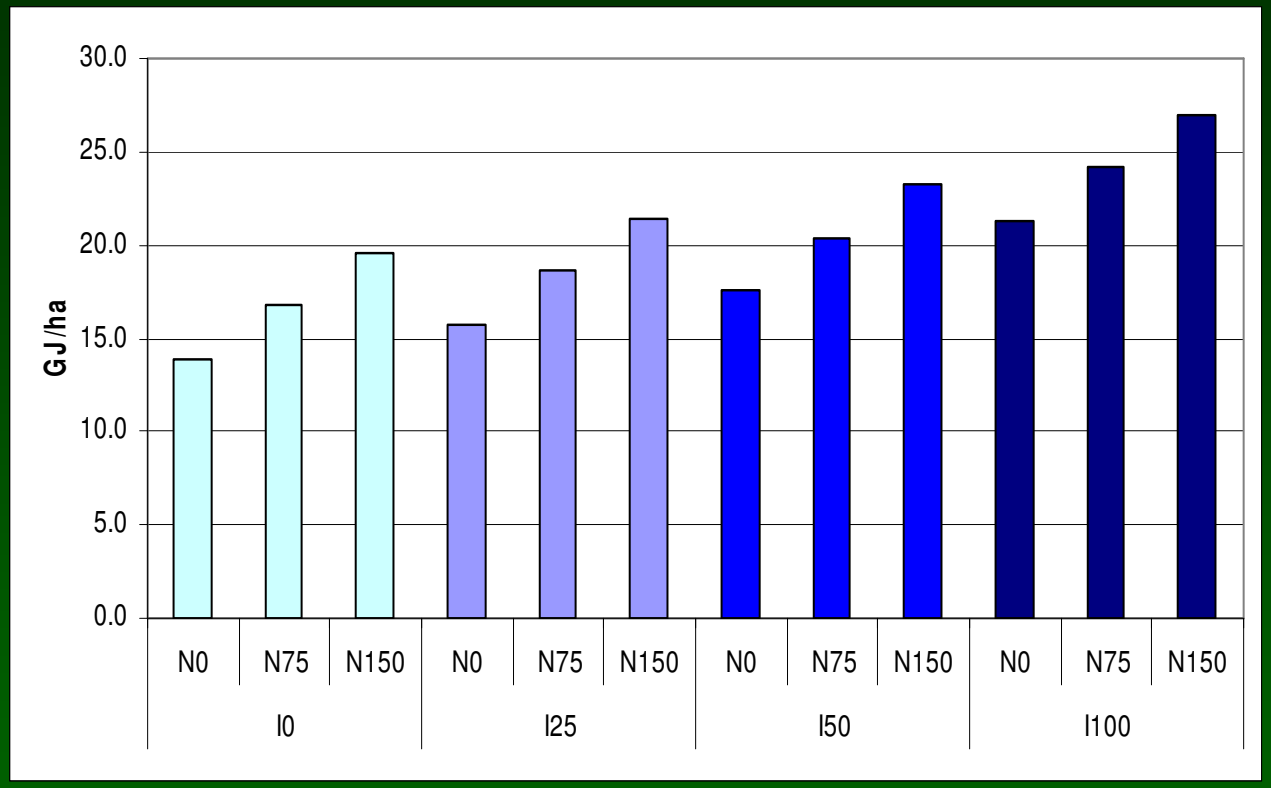
	FACTOR	
Nfertilizer	0.0386	GJ.kg-1
Pfertilizer	0.0076	GJ.ha-1
Kfertilizer	0.003	GJ.ha-1
Seed	1	GJ.ha-1
pesticides	x	
Machinery	8.7	GJ.ha-1
Irrigation	0.00131	GJ.m-3
drying and storage of biomass at the farm	x	

Energy inputs – Production phase



- ⇨ Varieties (no ≠)
- ⇨ Sowing dates
  - ⇨ earlier sowing, more irrigation, more energy
- ⇨ Sowing densities
  - ⇨ Higher nºseeds/m^2
  - ⇨ Higher E_{input}

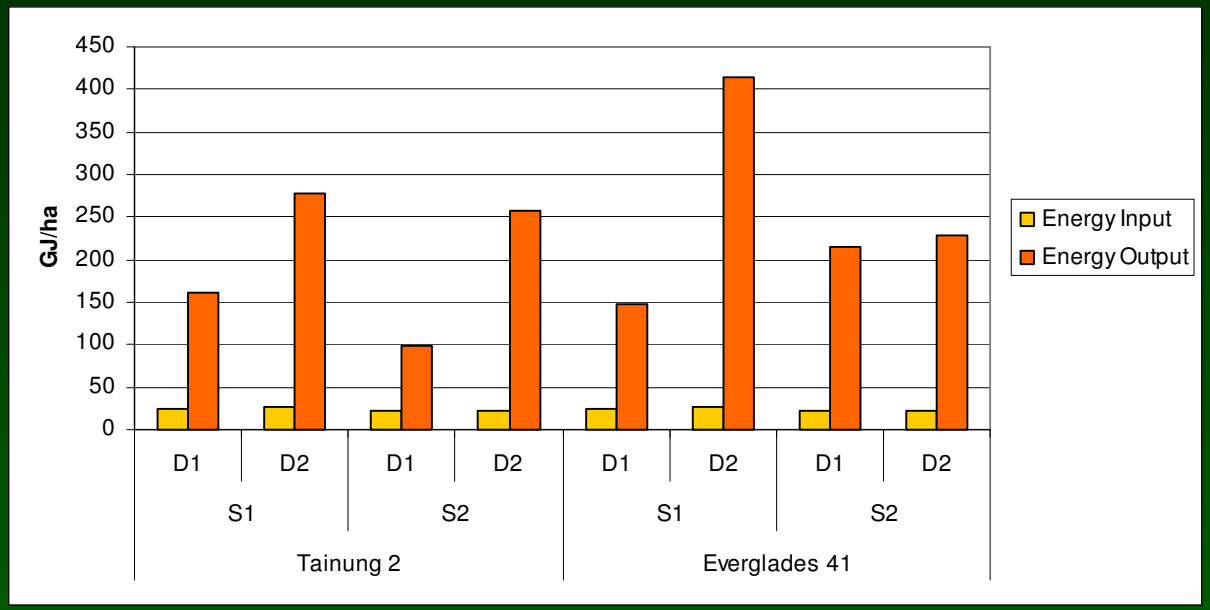
Energy inputs – Production phase



- ⇨ $N_{fertiliser}$
  - ⇨ Higher N
  - ⇨ Higher E_{input}
- ⇨ Irrigation level
  - ⇨ Higher I
  - ⇨ Higher E_{input}

But are those differences really important?
compared to the hypothetical energy output?

Energy inputs – Production phase



⇨E_{input} << E_{output}

⇨Higher Prod

⇨Higher E_{output}

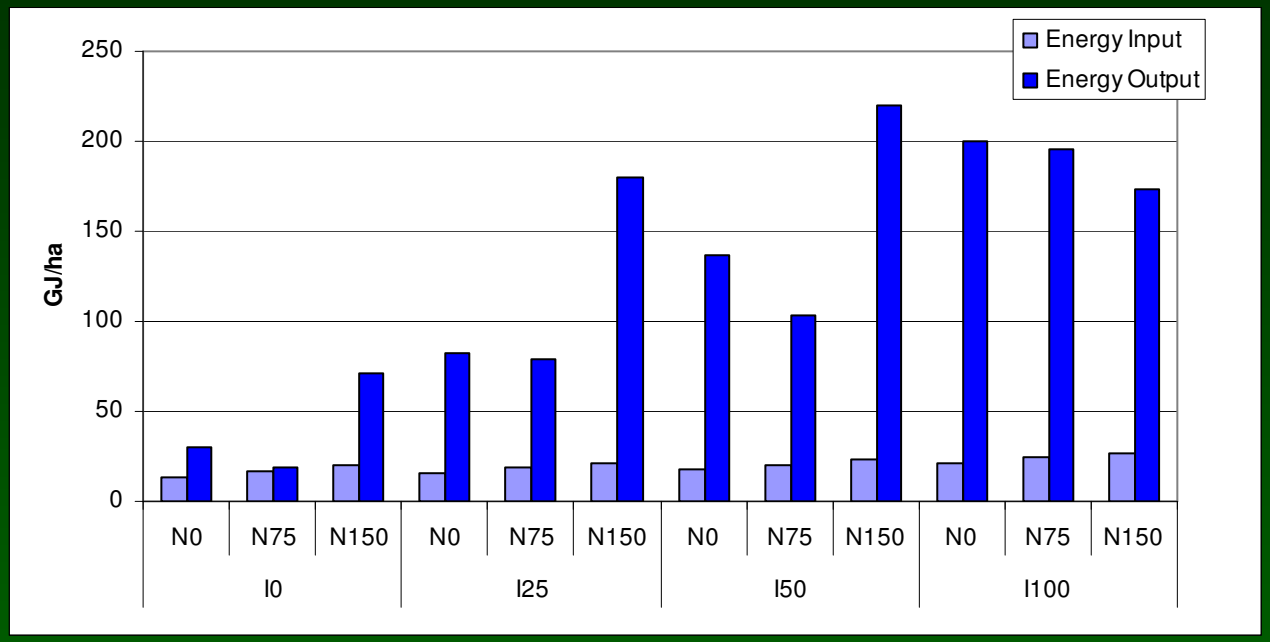
Productivity:

Early sowing > Late sowing

40 seeds/m^2 > 20 seeds/m^2

Everglades 41 > Tainung 2

Energy inputs – Production phase



⇨E_{input} << E_{output}

⇨Higher Prod

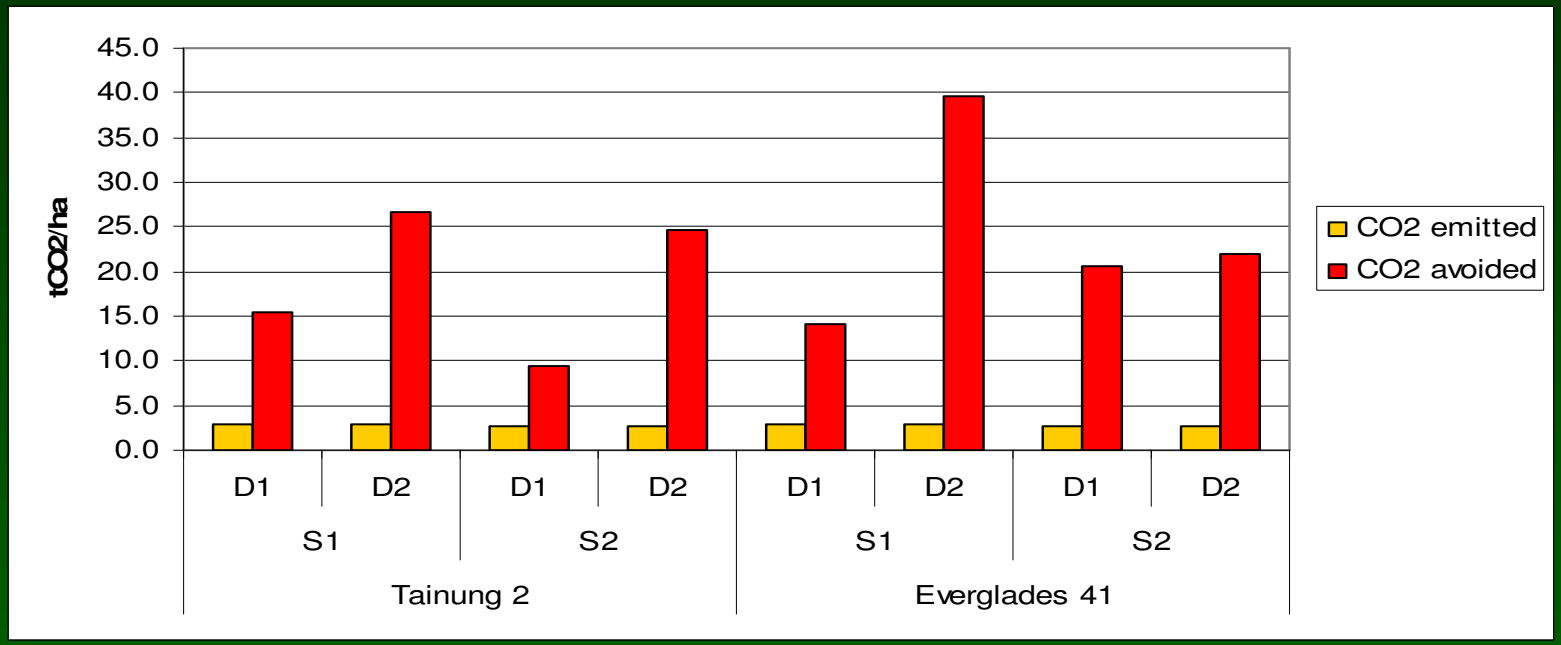
⇨Higher E_{output}

Productivity:

I0 < I25 < I50 < I100

N0 = N75 < N150 kg/ha

Emission of Greenhouse Gases

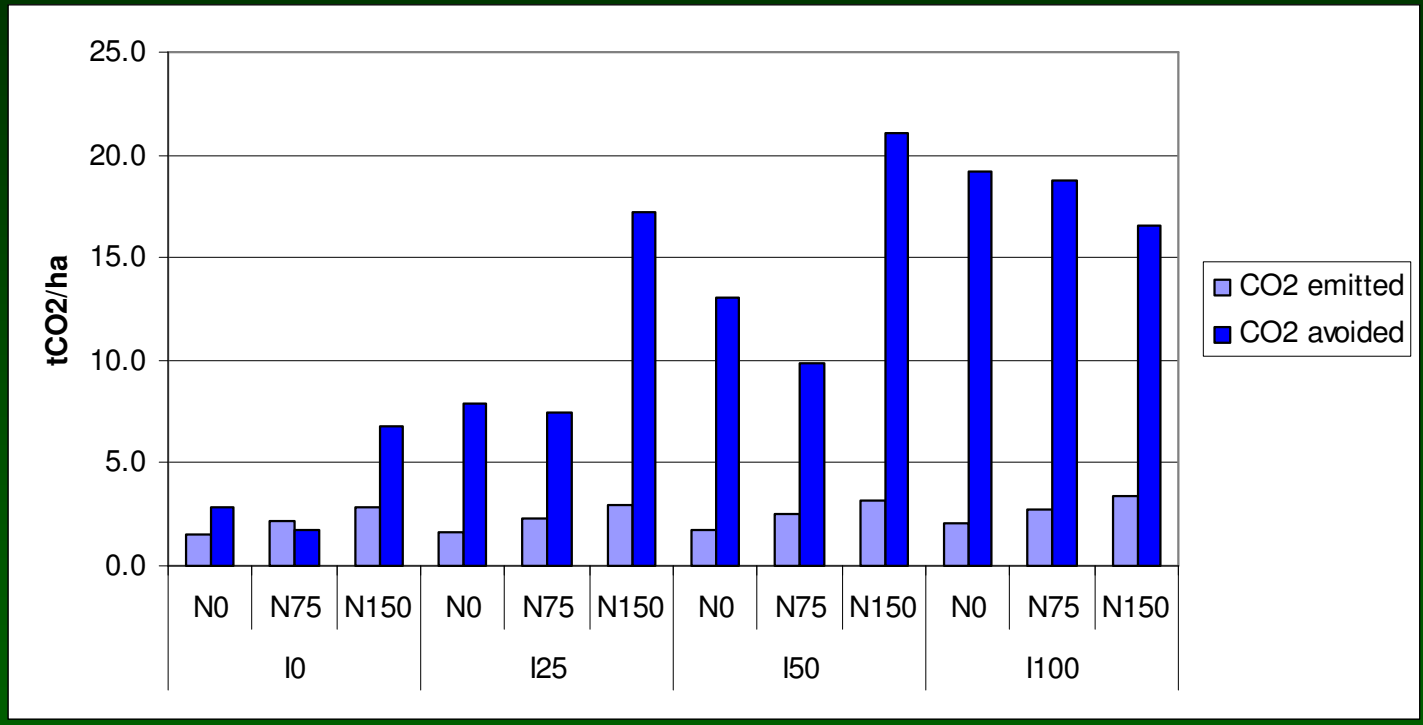


⇨CO_2 emitted << CO_2 avoided

⇨Higher Prod

⇨Higher CO2 avoided

Emission of Greenhouse Gases

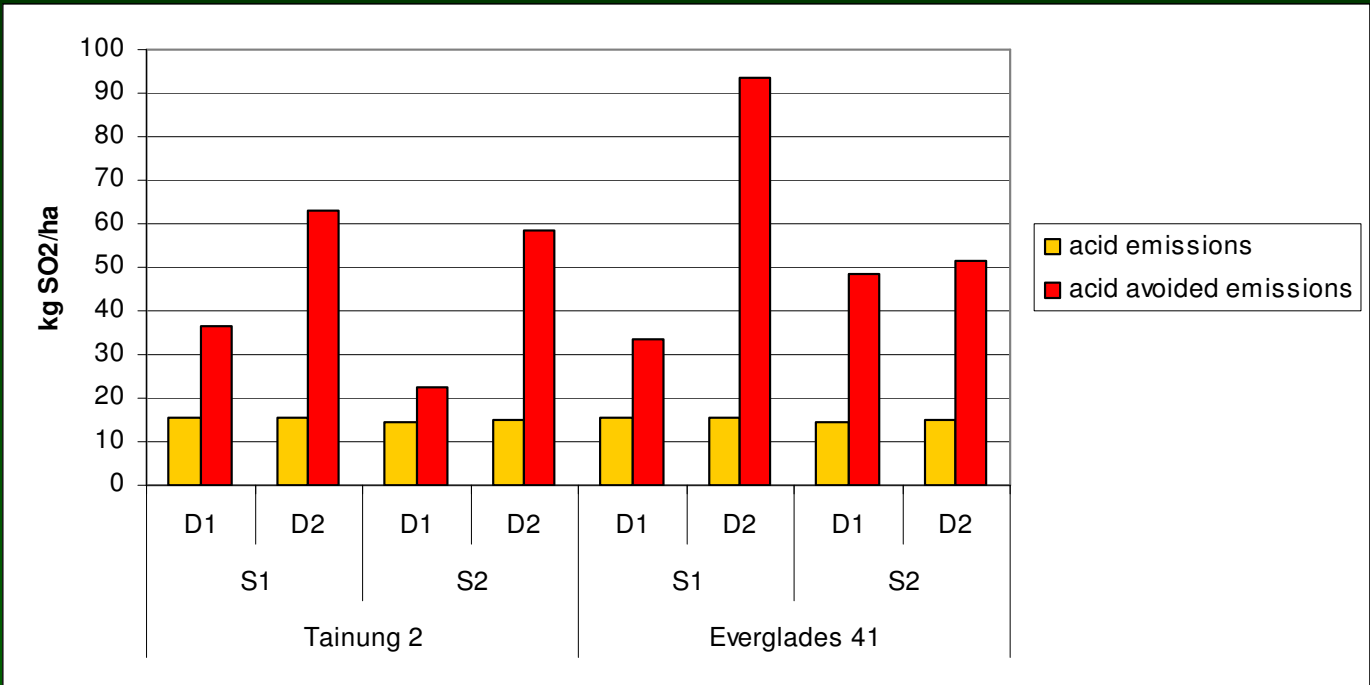


⇨CO_2 emitted << CO_2 avoided

⇨Higher Prod

⇨Higher CO2 avoided

Emission of acidifying Gases *(NH3, NOx e SO2)*

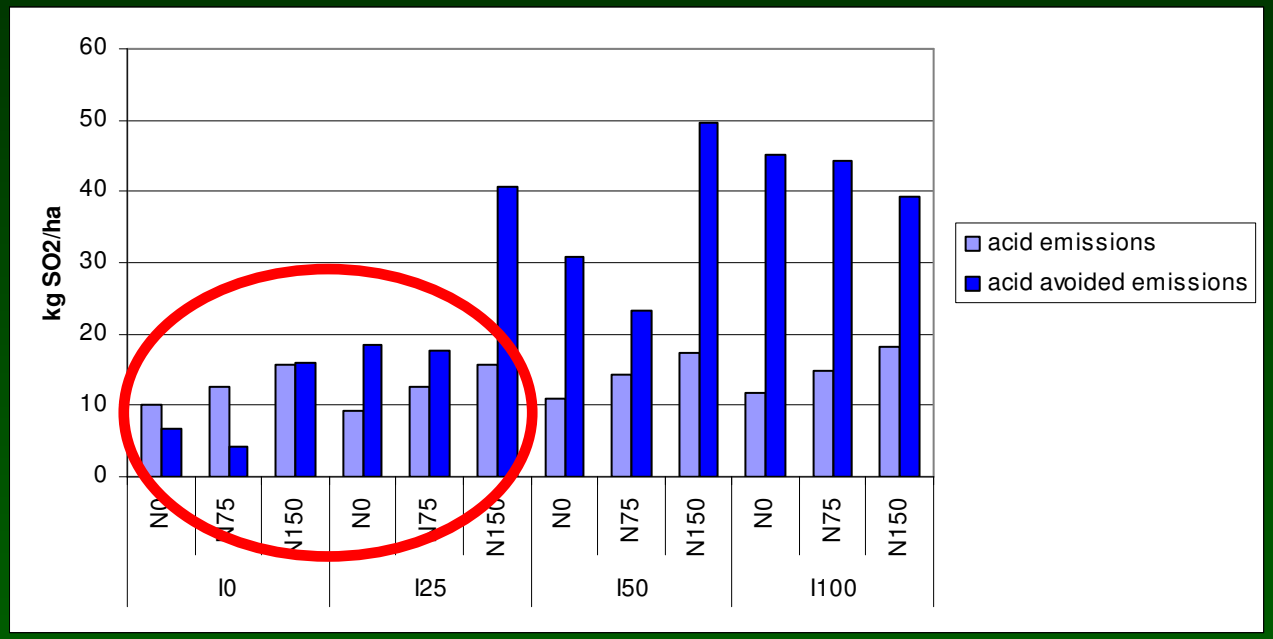


⇨Acid gases emitted << acid gases avoided

⇨Higher Prod

⇨Higher acid gases avoided

Emission of acidifying Gases *(NH3, NOx e SO2)*



⇨Higher Prod

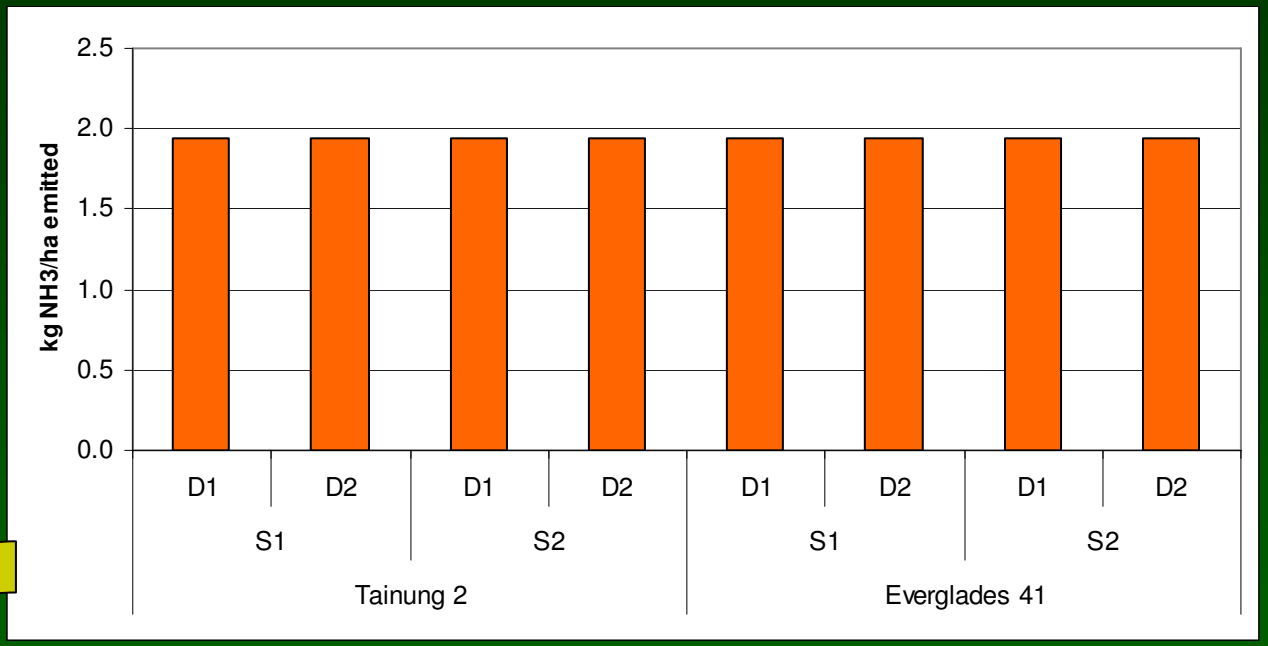
⇨Acid gases emitted < acid gases avoided

⇨Lower Prod

⇨Acid gases emitted = acid gases avoided

Emission of ozone depleting gases

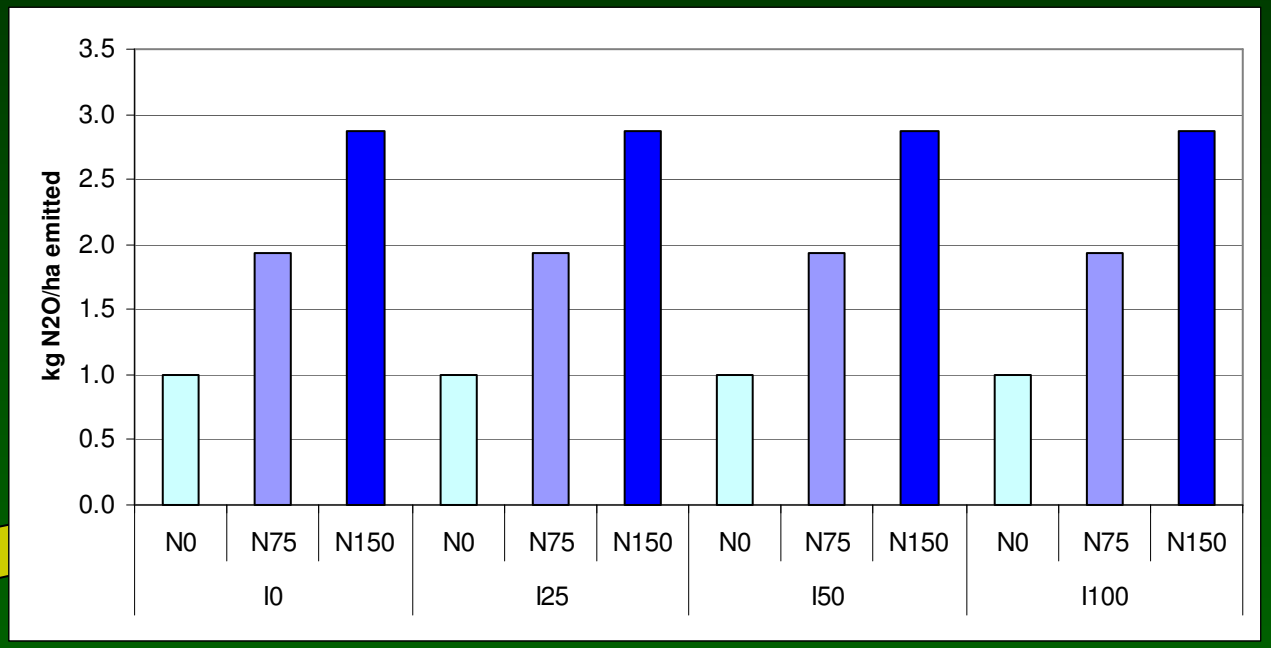
N_2O is the only gas considered



No differences, the same applied Nitrogen

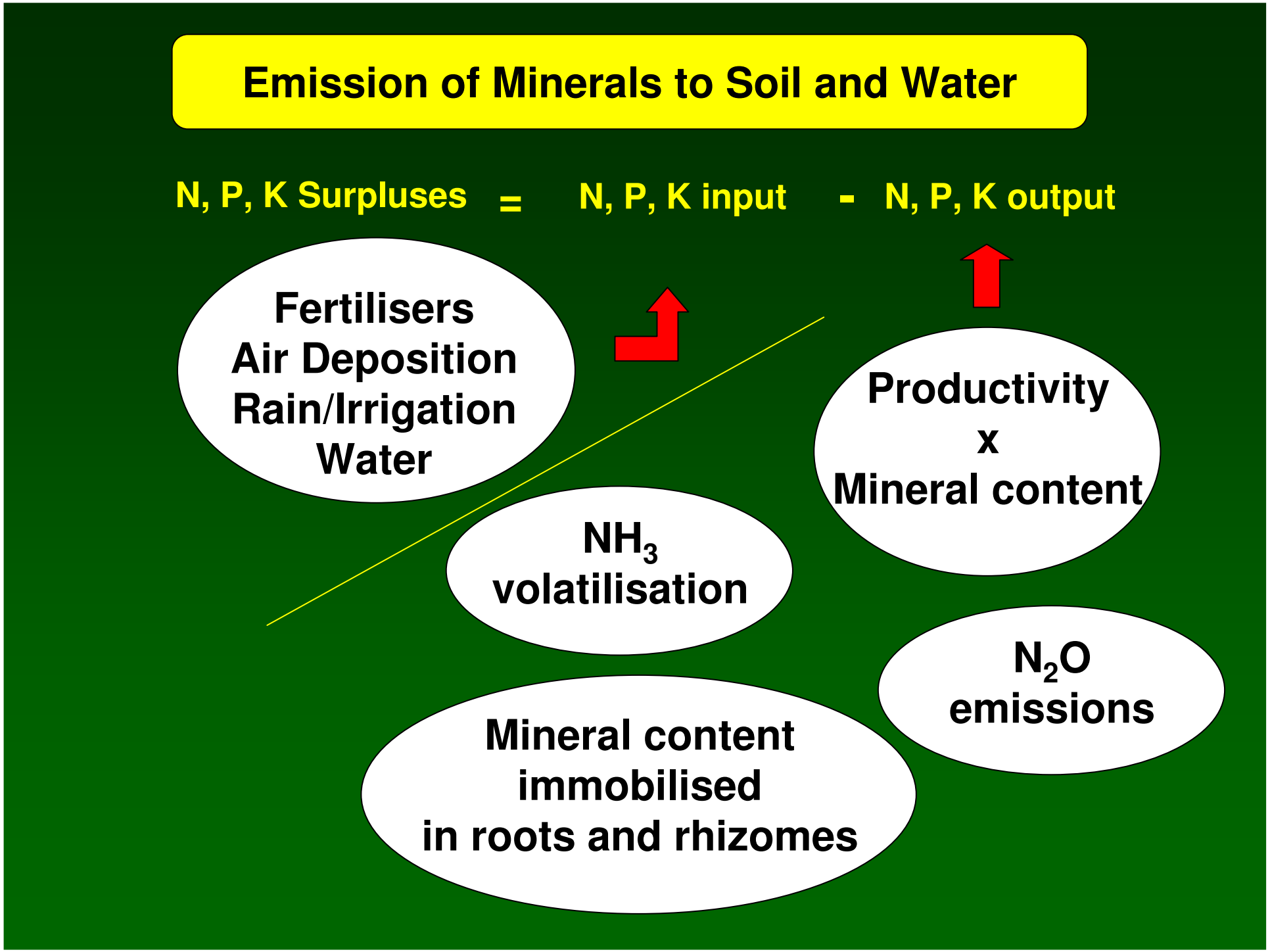
Emission of ozone depleting gases

N_2O is the only gas considered



Higher Napplied

Higher emissions


Emission of Minerals to Soil and Water
N, P, K Surpluses = N, P, K input - N, P, K output
Fertilisers
Air Deposition
Rain/Irrigation
Water
Productivity
x
Mineral content
NH3
volatilisation
N2O
emissions
Mineral content
immobilised
in roots and rhizomes

Emission of pesticides

– amount of pesticides per group (herbicides, fungicides, insecticides and other pesticides) that is used

- scores of harmfulness of the several applications are applied

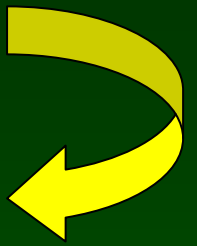
- total score on pesticides is calculated, indirect effects are analysed

Soil Erosion

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

Rainfall

Harmful Rainfall



Groundwater depletion

- 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

- **To be followed…**