Crops and fodder for sustainable organic low input dairy systems

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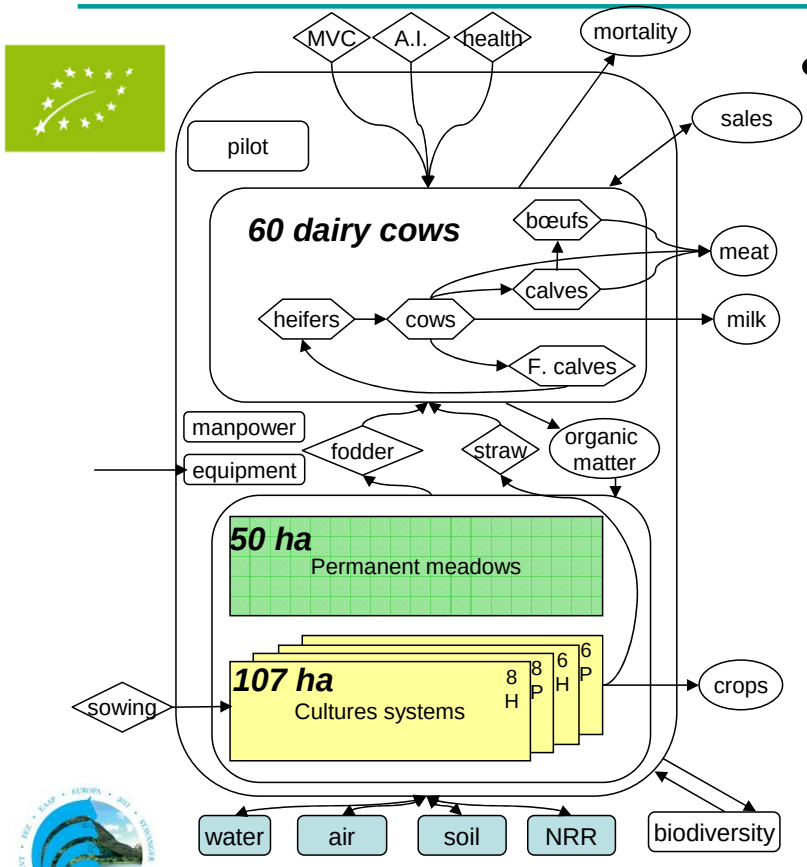
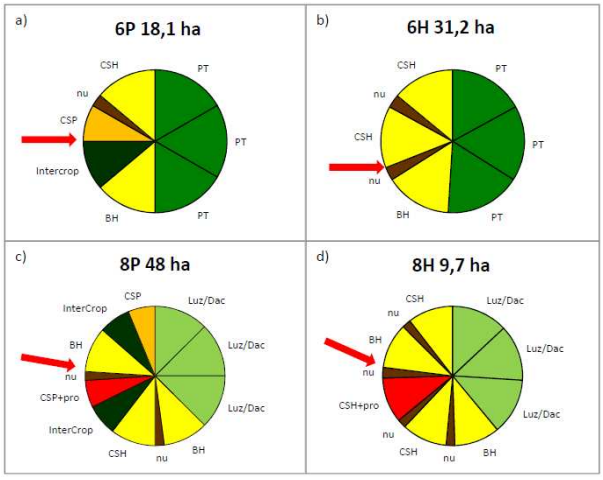
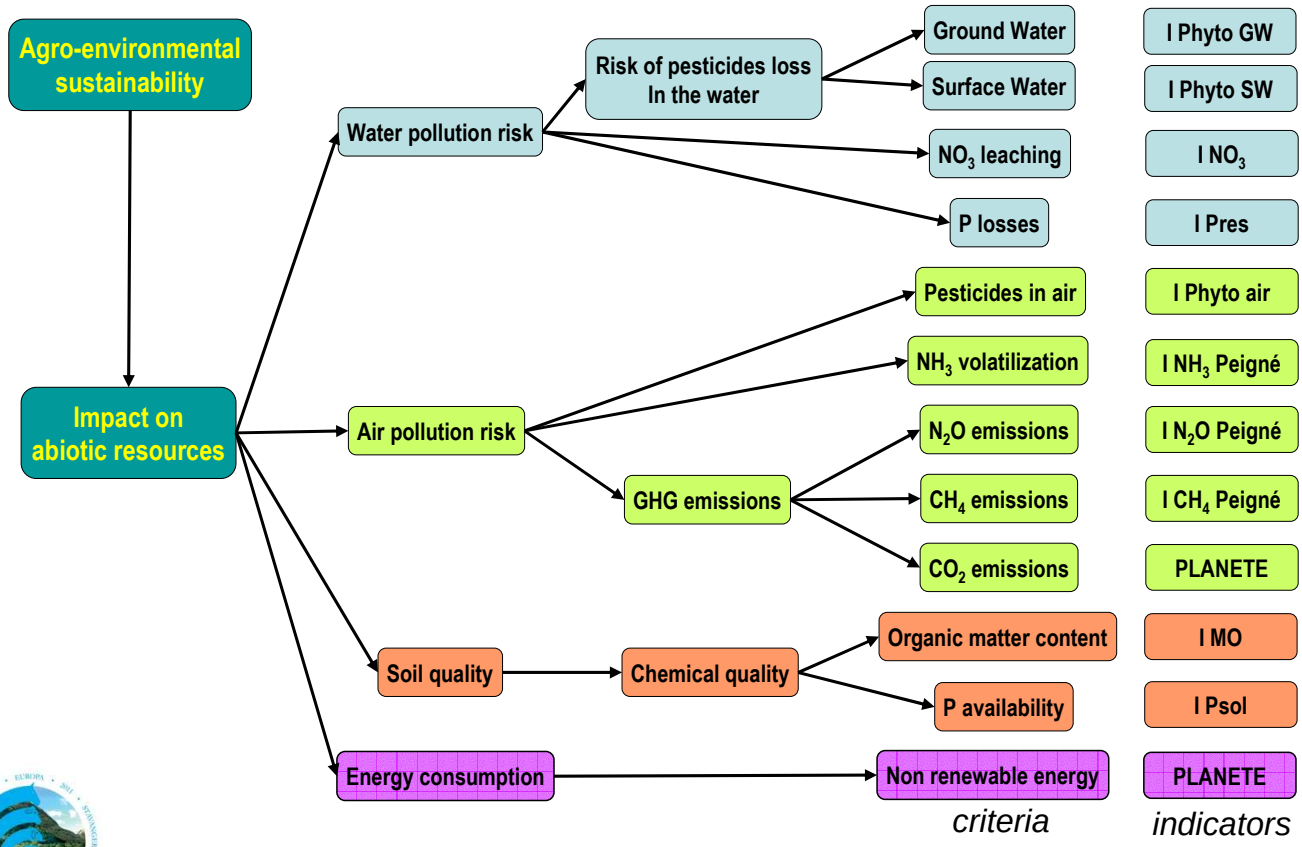
The Mixed Farming System



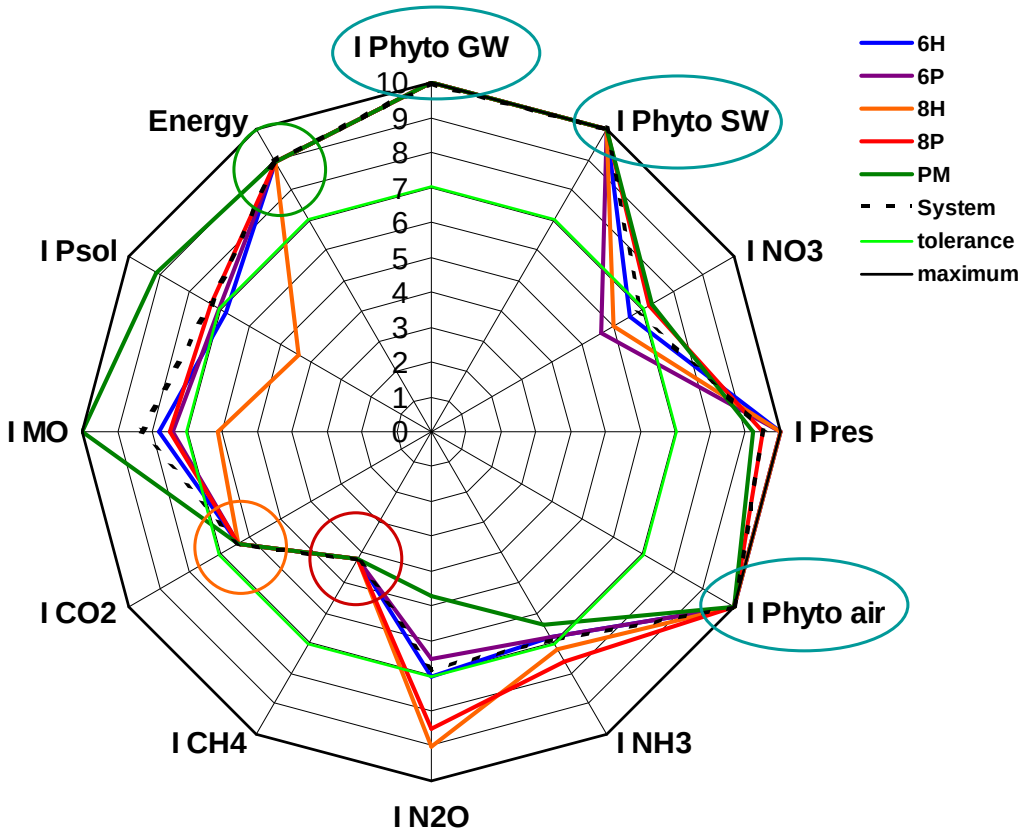
- General objectives
  - Organic
  - Autonomy
  - Sustainability



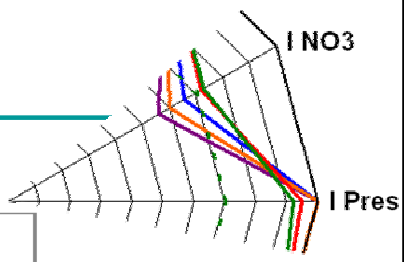
System assessment for abiotic components

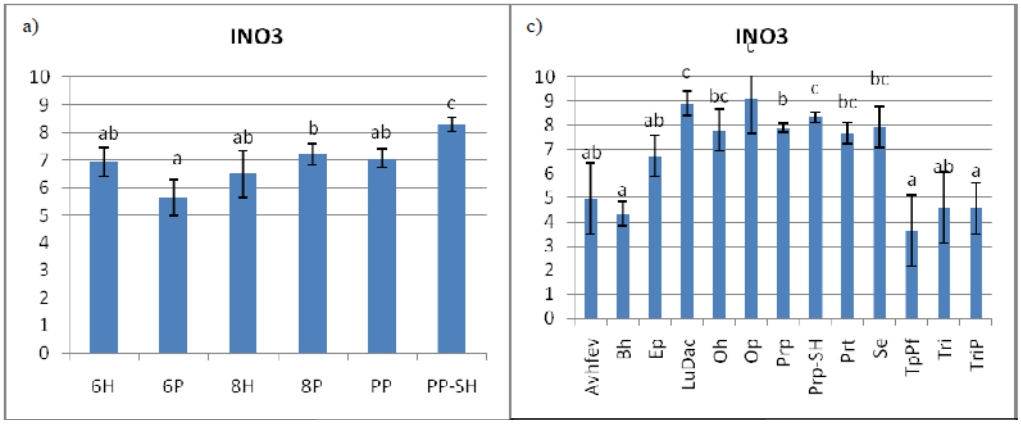


Indicators levels for culture systems



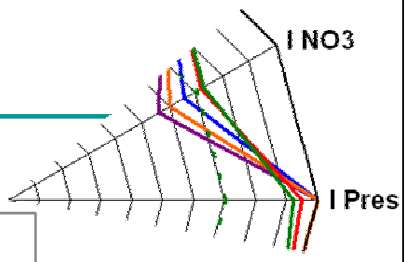
Water pollution: NO_3, P

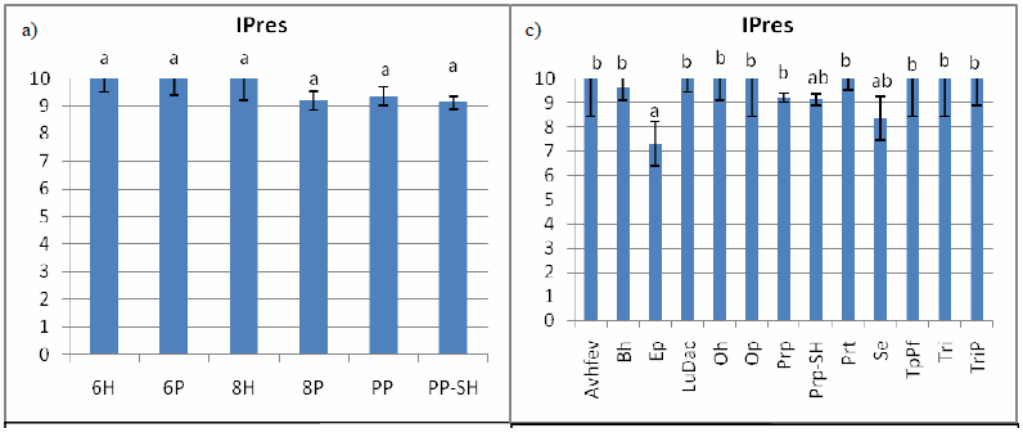




Permanent meadows: low input of manure, soil covered
Lower values: over-fertilization (11 / 67 plots)
or no cover crop (17 / 67 plots, winter cereals)

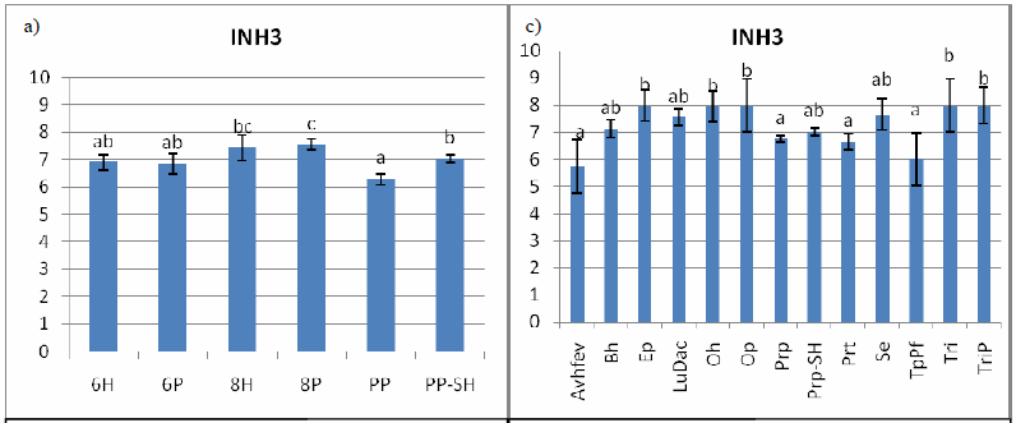
Water pollution: NO_3, P

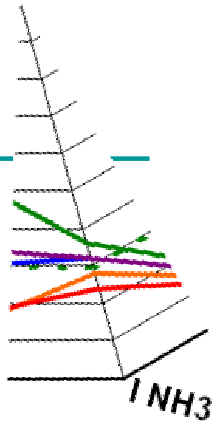




Low amount of P potentially lost in surface water
(inputs - recommended dose)
No difference between rotations, all cultures >7

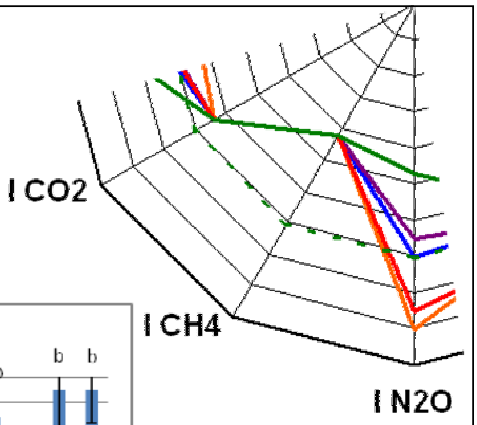
Air pollution: NH_3



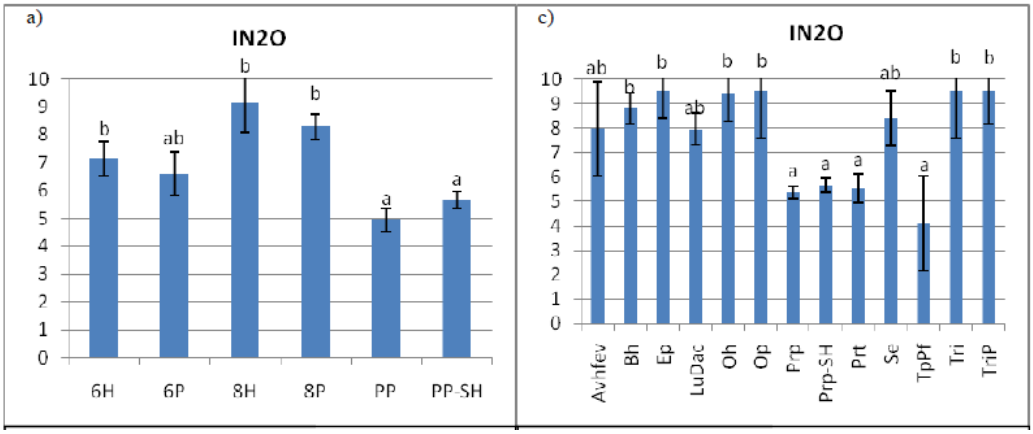


I NH_3: 6.9; Emission: 19.7 kg NH_3/ha
8P: not fertilized alfalfa+dactyle in place of temporary meadows
Better results for crops

Air pollution: GHG

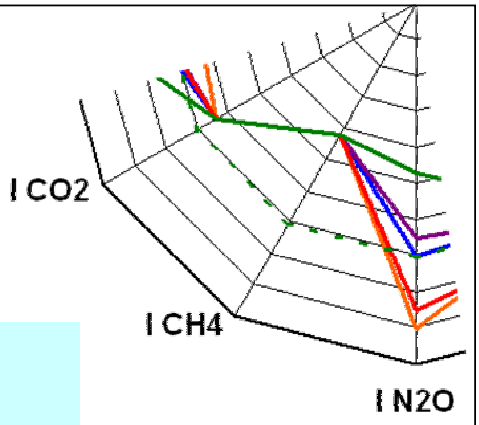


- I N_2O



Mainly due to manure handling
I N_2O: 6.8; Emission: 1.6 kg N_2O/ha
Meadows: low values
No differences between crops

Air pollution: GHG



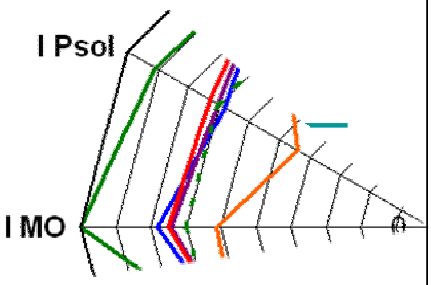
- I CH_4 (Peigné 2003)

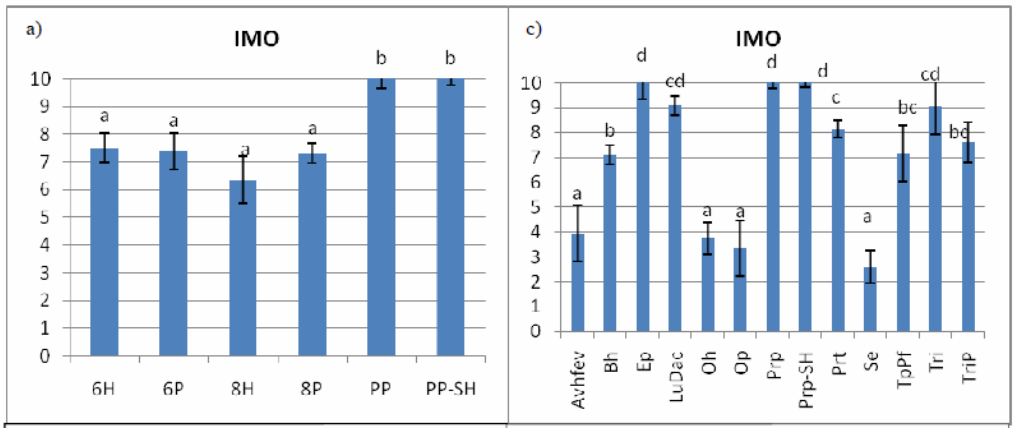
At system level,
= enteric fermentation + barns & stocking piles
I CH_4 = 4.2 : hay enhances fermentation/CH_4 emission
228 kg CH_4/milking cow

- I CO_2 (PLANETE, Bochu 2008)

At system level (fuel & electricity consumption)
I CO_2 = 6.4
0.3 t CO_2/ha

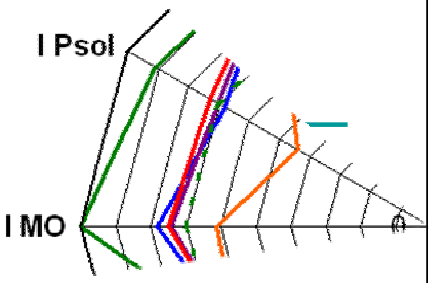
Soil quality: OM, soil P

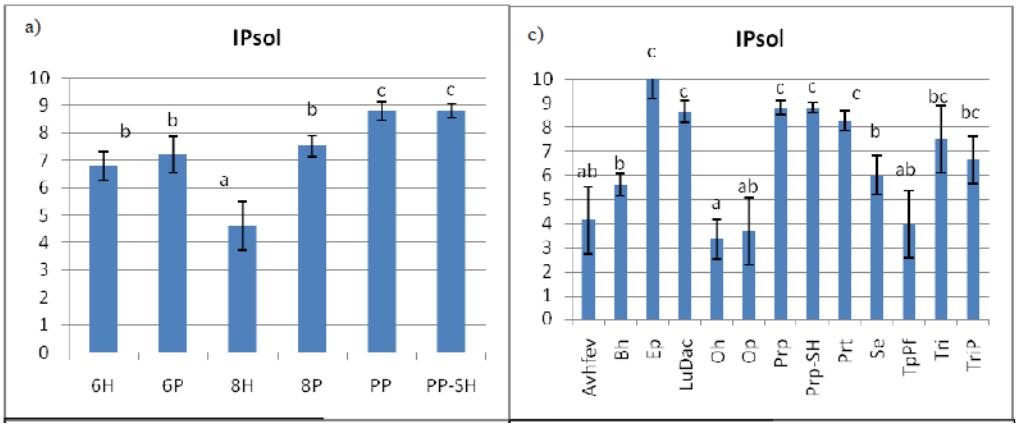




I MO: 8.3
Good level of organic matter in the soil: 1207 kg humus/ha
++: organic fertilization, cover cropping, mixed cropping

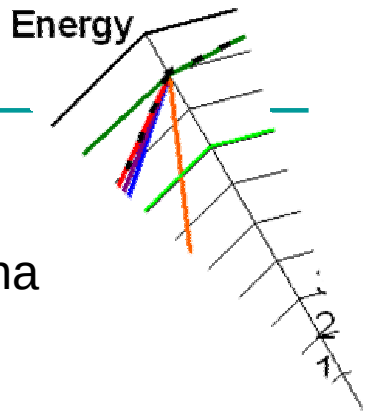
Soil quality: OM, soil P





I Psol: 7.3
Observed P deficit in the soil: 25 kg P_2O_5/ha
Threshold P deficit limit: 30 kg P_2O_5/ha
Low value for 8H, high for meadows
Use of slurry poor in P

Energy: I En

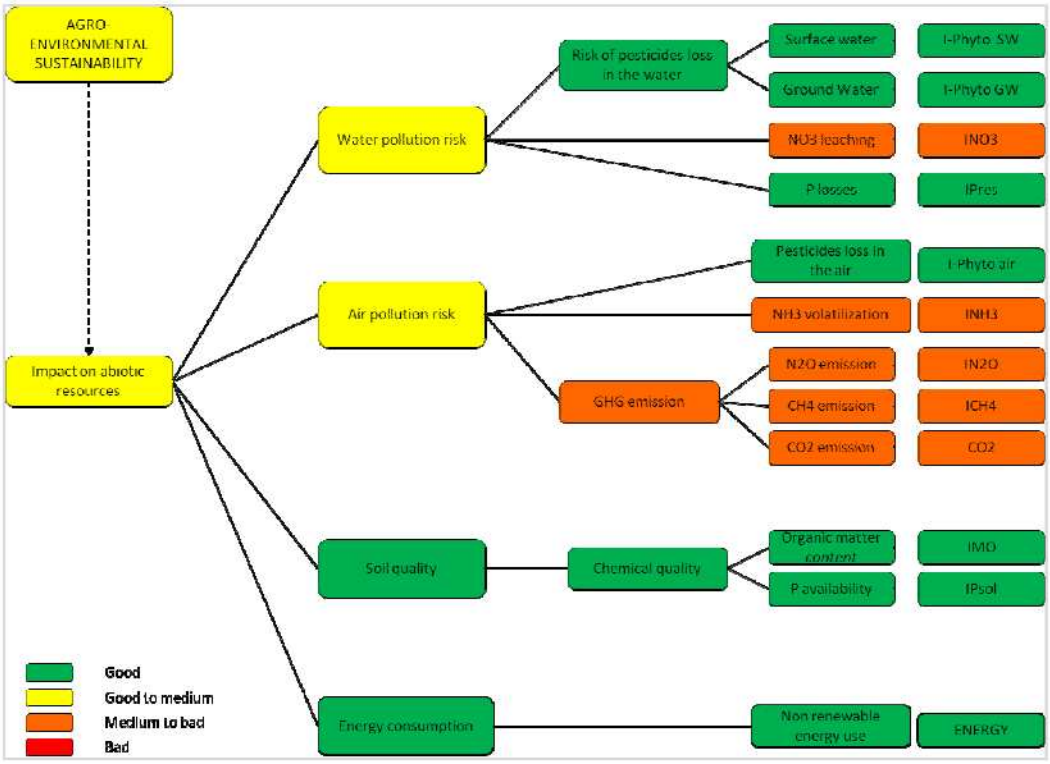


- I Energy (PLANETE, Bochu 2008)

  Direct and indirect use of energy, MJ/year/ha

I En : 8.9
Direct energy: 3333 MJ/year/ha
Indirect energy: 2104 MJ/year/ha

Overview



Conclusions

- Globally, medium to low impact of the studied organic mixed crop-livestock system on abiotic resources
- Worst performance for air pollution
- Winter cereals not preceded by a cover crop, or over-fertilization of permanent meadows result in nitrate leaching
- Mixed cereals and proteaginous induce more ammonia volatilization

Conclusions

- Such an assessment is useful to re-design a farming system
- Biotic resources, social and economic components are further developed in order to take into account all elements of the system
- Validation of some indicators is to be performed

Thank you for your attention