

System approach to increase fertilizer efficiency

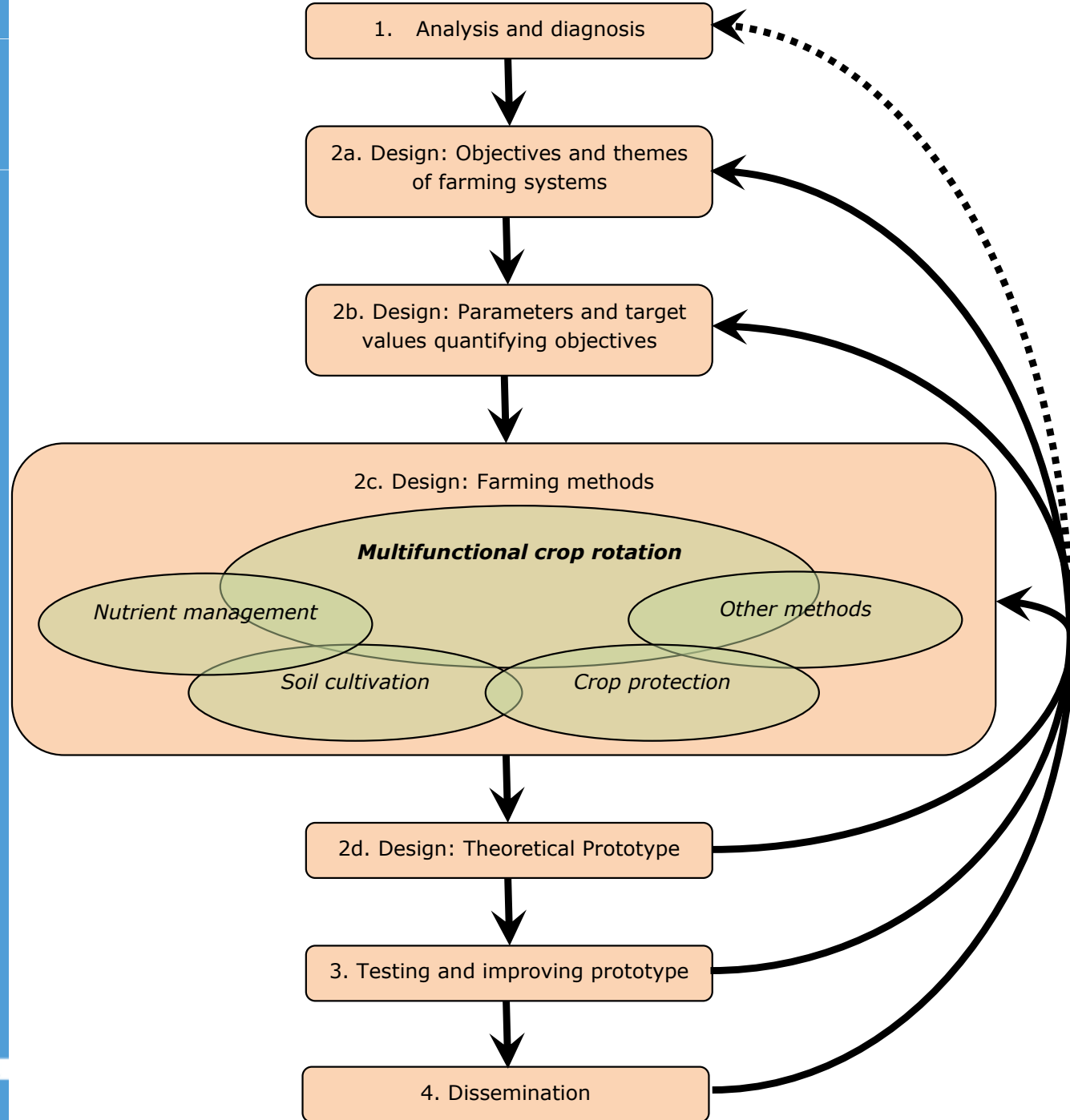
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EIP Focus group Fertilizer Efficiency in Horticulture
Almeria, 21 October 2014



Prototyping

■ Farm level



Vegineco project (1998-2002)

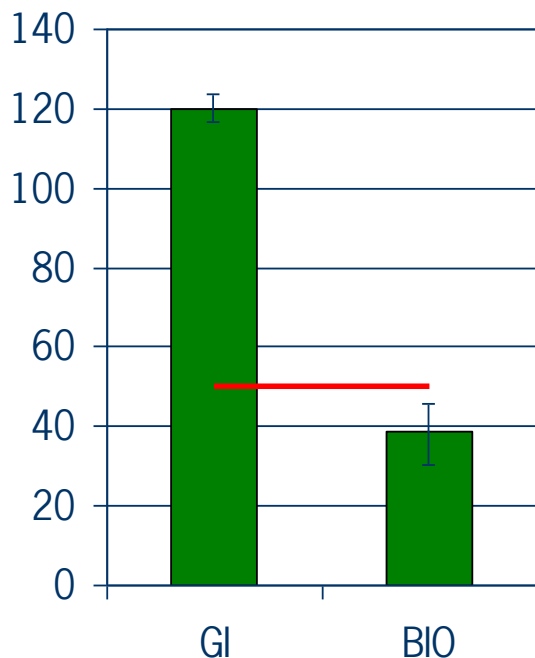
- Using integrated approach can improve results strongly
 - However, often gaps with target values remain
- Many problems and solutions discussed here already mentioned in the project
 - cost-benefits,
 - estimation mineralization



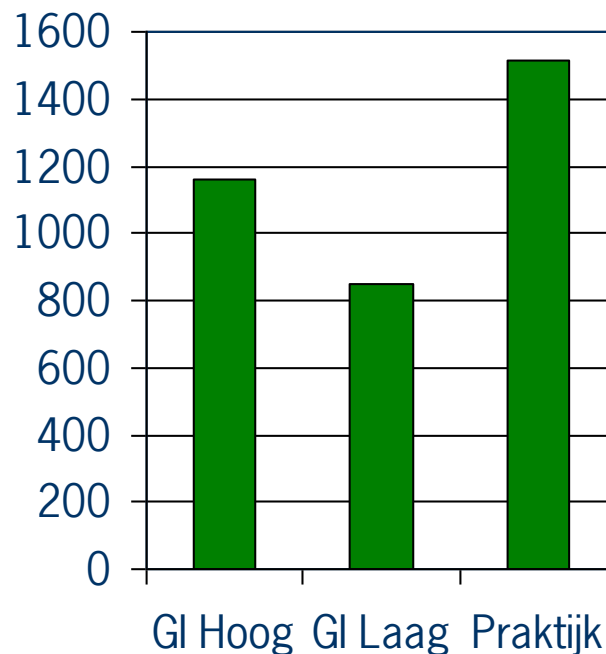
Main results Nutriënten Waterproof Arable farming sandy soils SE-NL



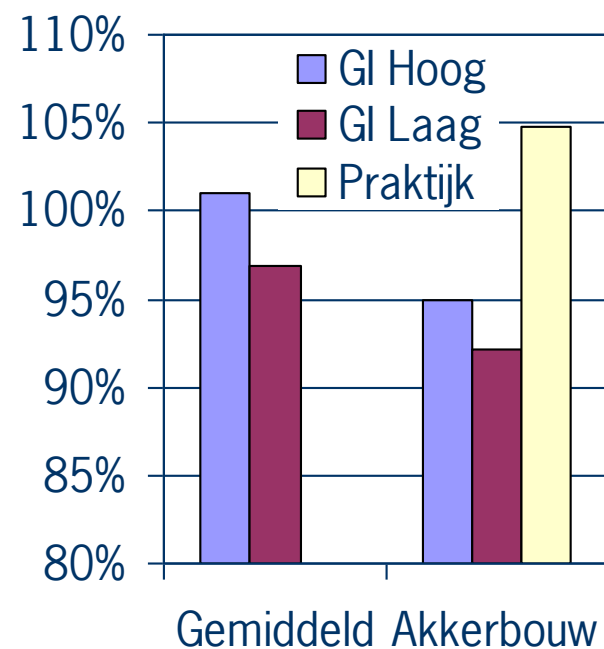
Nitrate leaching (mg nitrate/l)



Net return arable crops (euro/ha)



Yield (relative)



Conclusions Nutriënten Waterproof



- EU Nitrate direction can only be reached in combination with yield reduction
- Fertilization measures have only limited effect
 - Precision fertilization, fertilizer choice, split application
 - Effective: row fertilization with slurry in maize
- Effective measures have bottlenecks
 - Catch crops
 - Removal of crop residues



Effect of measures on nitrate concentration groundwater

Measure	Effect on nitrate concentration mg/l nitrate	
	Crop	Rotation
Removal crop residues (sugar beet)	-20	-3
Catch crop (after summer barley)	-30 tot -60	-5 tot -10
Early harvest and growth well developed catch crop (maize, potato)	-30	-5
Optimization nitrogen application	Crop dependend	0 tot -5



New farming systems needed: 2 innovation pathways

Agro-ecological approach

- Soil management
- Organic principles
- Extensive crop rotations

Technological approach

- Soilless cultivation
- High value crops
- Intensive production



Recommendations

Think in systems

- Evaluate constraints, challenges and opportunities on
 - biophysical, socio-economic and institutional aspects
- Improve other growth limiting factors while improving fertilization
- Combine measures together in a farming system
- Evaluate the farming systems with a defined parameter set with target values
- Develop integrated soil management



Beyond the farming systems approach

- Product chain
 - From seed to salad
- Food systems
 - Physical and socio-cultural aspects
- Knowledge systems:
 - Interdisciplinary
 - Multi-actor
 - Public-private partnerships

