Best Ecological Means, a triple win in the EU

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Technology and food

From horse to tractor

New technology?

FOOD QUANTITY

FOOD REQUIRED

FOOD PRODUCED

Time

Food Quantity
Global grain productivity (1950 – 2012)

Source: FAOstat
Megatrends in agriculture
Production ecological principles

Defining factors
- CO₂
- radiation
- temperature
- crop genetics

Limiting factors
- water
- nutrients (N,P,K)

Reducing factors
- weeds
- pests
- diseases
- pollutants

Post-harvest losses
- microbial
- insects
- rodents
- waste

Potential production

Attainable production

Actual production

Yield gap

Available production

Yield increasing measures

Yield protecting measures

Post-harvest technology
- storage
- packing
Scenario studies for future developments

'\textit{a change that}' \quad '\textit{what if ?}'

predictions \quad explorations

projections \quad speculations

'\textit{systematic research}'

'\textit{deductive research}'
Land use scenario’s

Scenario’s & input-options

EU NUTS

CROP MODULE
- genotype
- climate
- soil

‘Grond voor Keuzen’ (WRR, 1992)
EU: soil use

Acreage (mln ha)

- free market & trade
- regional development
- nature & landscape
- environment protection
- reference (1992)

‘Grond voor Keuzen’ (WRR, 1992)
EU: pesticides

Active agent (mln kg)

0  100  200  300  400  500

free market & trade  regional development  nature & landscape  enviroment protection  reference (1992)

‘Grond voor Keuzen’ (WRR, 1992)
Wheat yields EU (water limited)

‘Grond voor Keuzen’ (WRR, 1992)
Potato yields EU (water limited)

'Sgrond voor Keuzen' (WRR, 1992)
Precision agriculture: drones & farmbots

Agro drone monitoring crop growth

EUROP: European Robotics technology Platform

(Duurzaambedrijfsleven, 2018)

(Future impression by E. Keatsirikul) Planting, spraying & harvesting
Energy efficient greenhouses

photo: Luca Locatelli (National Geographic magazine, Sept 2017)
Soilless culture

photo: Luca Locatelli (National Geographic magazine, Sept 2017)
Metropolitan agriculture

photo: Luca Locatelli (National Geographic magazine, Sept 2017)
Best Ecological Means in nature & agriculture
To share or to spare

Biodiversity

& ecosystems

services

Agricultural yield

Agricultural yield

evolution ecology
- ecological integrity
- biodiversity

integration

resource ecology
- multifunctional
- secure local resources

production ecology
- high productivity
- efficient resource use

nature

agriculture

Wageningen University

& Research
Best Ecological Means: *triple win*

1. economically efficient
2. least impact on environment
3. more biodiversity
4. Best guarantee for food security
5. Opportunities for biobased economy
Conclusions

- EHS as backbone in the EU possible
- Less agricultural land possible
- Threat by suboptimal agriculture and use of biofuel
- Three-way split desirable and achievable
Thank you