APPLIED PLANT RESEARCH

Research on Organic Agriculture in the Netherlands

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Personal introduction

- Wijnand Sukkel

  Wageningen University and Research Centre (WUR), Business Unit: Applied Plant Research

- Specialist organic agriculture
  - Research Coördinator: Organic open field production
  - RC: Energy use and ghg emissions in organic agric.

Organic agriculture in the Netherlands

- Conditions: high land and labour costs, capital intensive, specialised
- Acreage: 49.000 ha (2,6% of total)
  - Grass and fodder: 34 000 ha
  - Potatoes, fruits, vegetables: 6 000 ha
  - Cereals 5 000 ha
- No farmers: 1 500

Organic agriculture in the Netherlands

- Main Products
  - Dairy
  - Pig meat
  - Potatoes, carrots, onions, cabbage
  - Fresh market vegetables
  - Glasshouse vegetables
- Multifunctional
  - nature, health care, recreation,
  - direct selling, ...

Policy on organic agriculture

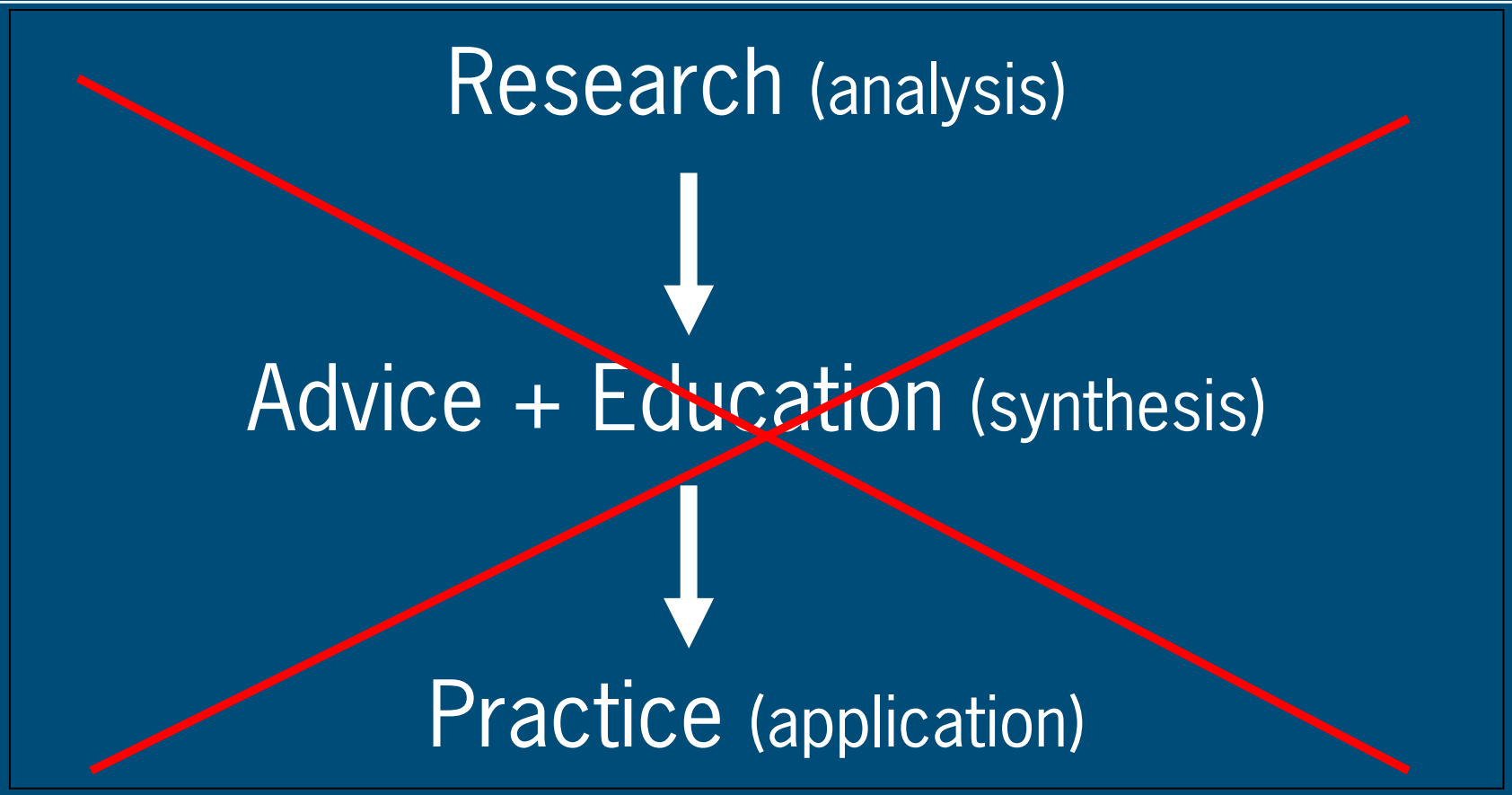
- Motivation:
  - sustainable development
- Goals:
  - 10% annual growth of consumer spendings
  - 5% annual growth of acreage
- Public investments
  - No direct subsidies for farmers
  - Development of the market for organic
  - Investments in Research and Development
- Spin off:
  - innovation and inspiration for conventional agriculture

Research in organic agriculture

- 10 % of public research funds to organic
- 9 million public + ap. 2 million private (Euro's/year)

- Organic sector has the lead in the agenda for research and knowledge transfer
  - Bioconnect (total organic production chain)
  - Ownership
  - Vision development

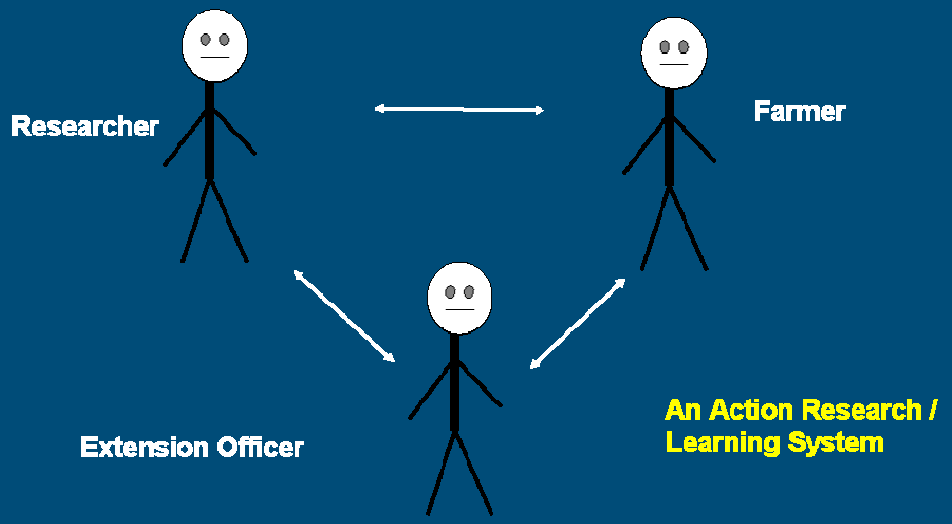
Research vision and methods

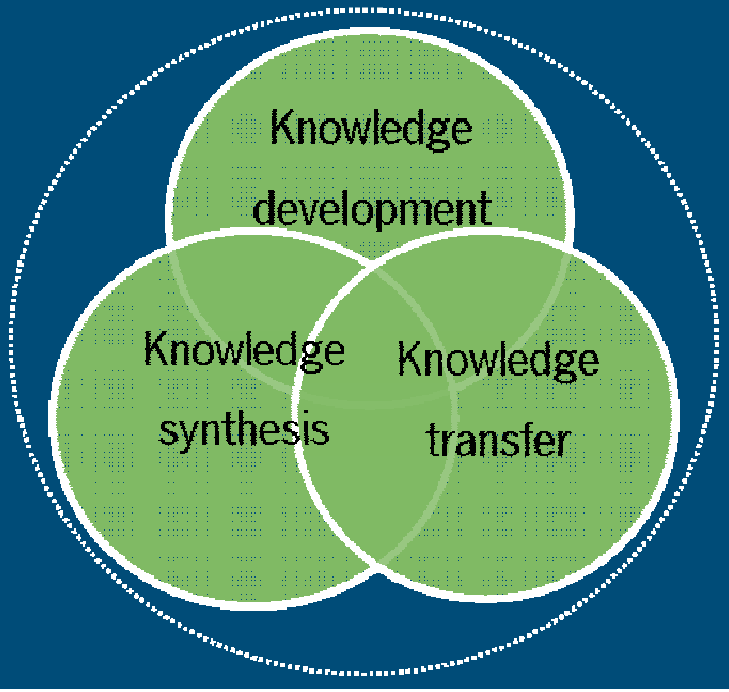


The classic model for the knowledge system is hardly used

Vision on research and knowledge

- Integration of knowledge development, synthesis and transfer
- Participatory approaches (networks)
- System/holistic approaches





Conventional	Organic
Uniformity	Diversity
Recipy	Concept
Reductionism	Holism
General	Situational
Control	Cooperation
Specialist	Universalist
Reaction	Precaution
Economy	Ecology
Global	Regional

Research programs for organic agriculture

- Plantbreeding and seed technology
- Soil fertility
- Animal production
- Plant production (outdoor and glasshouse)
- Energy use and climate
- Nature, landscape and multifunctional agriculture
- Market and production chains

Important research issues

- Control of weeds pests and diseases
- Sustainable soil management
- Animal welfare and animal health
- Minimising emission and accumulation
- Healthy, safe and tasteful food
- Enhancement Biodiversity, Nature and Landscape
- Connections to consumers and society

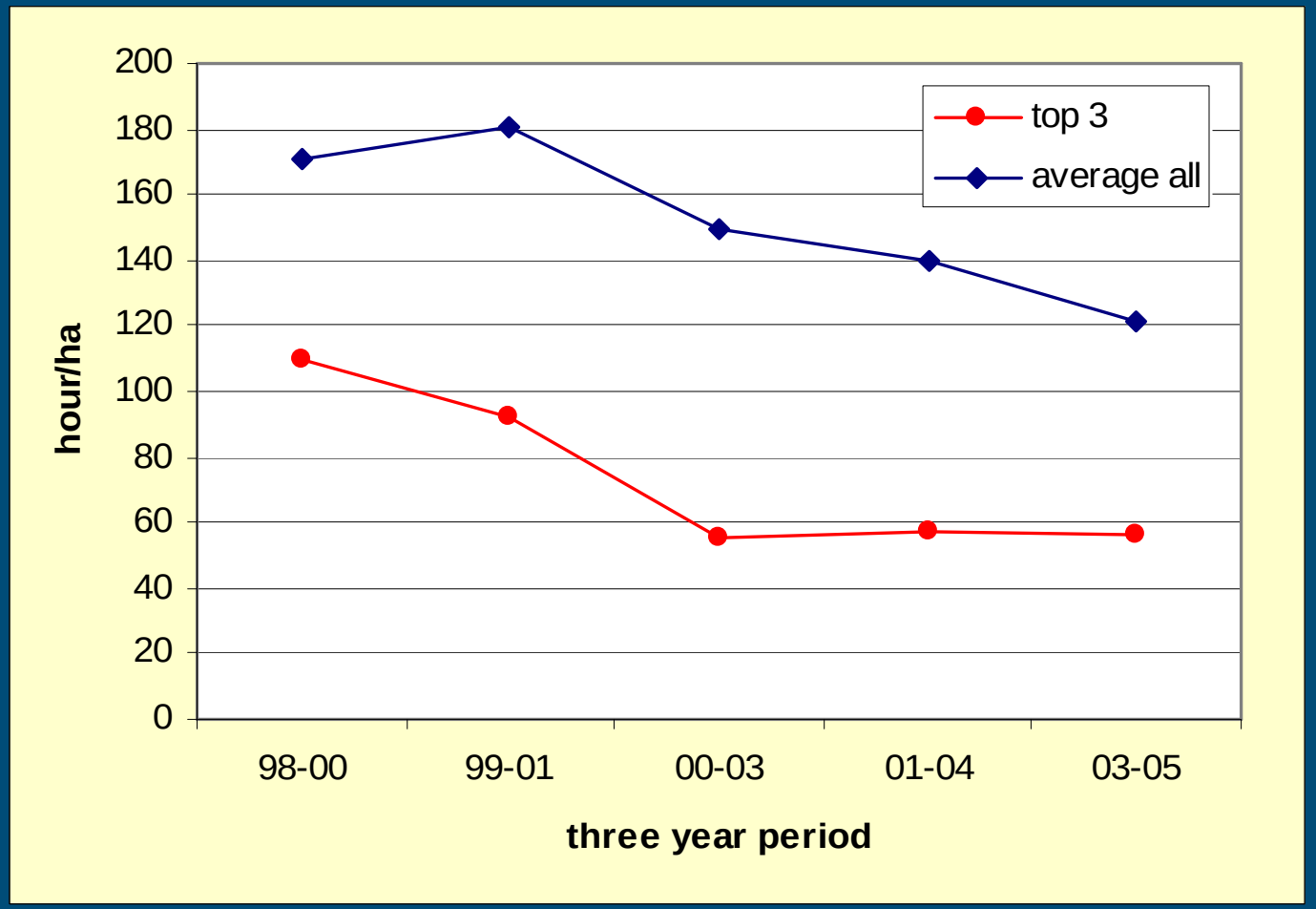
Control of pests and diseases

- UV light and ozone
- Onion oil against carrot fly
- Beetle eater

- Natural enemies against pea aphids
- Functional biodiversity
- Breeding for thrips resistance

Weed control

Hours of handweeding in wintercarrots



Animal health and welfare

Calves staying with their mother

Space for natural behaviour

Healthy and tastefull products

- More Conjugated Linoleic Acids (LCA) in breast milk
- Biomarkers for health effects

- Breeding and cultivation for taste
- Prevent contaminants and micro organisms

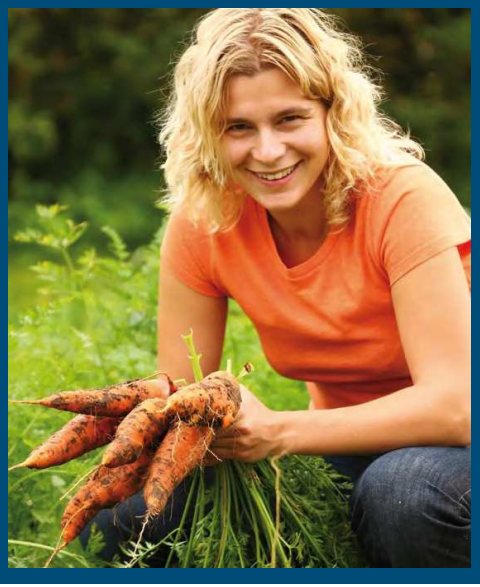
Economy, market and food chain

- Cost price calculations
- Product innovation and marketing

- Consumers preferences
- Product promotion

People and society

- Agrigulture and health care
- Urban agriculture
- Consumers participating in farms



- Recreation on farms
- Combining agriculture and nature

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Sustainable soil management

- Soil compaction
- Ridge till
- Controlled Traffic
- Conservation Agiculture
- Combinations of techniques

Soil and mechanisation

- Controlled Traffic systems, GPS
- Ridge tillage
- Minimal soil compaction
- Organic matter management
- N_2O emissions
- Zero tillage techniques

Onderzoek ruggenteelt Lauwersland (bio)

- Principe
  - Alle gewassen op ruggen
  - Kerende tot 15 cm, niet-kerend tot ca 30 cm diepte.
  - Rug in najaar splitsen/bouwen (gewasresten, onkruid inwerken), evt. groenbemester zaaien
  - In voorjaar verweerde rug opnieuw splitsen/bouwen en inzaaien, planten
  - In voorjaar rug met groenbemester splitsen/bouwen en inzaaien, planten.

- Doel onderzoek
  - Haalbaarheid in Nederland


Machine BakkerBio

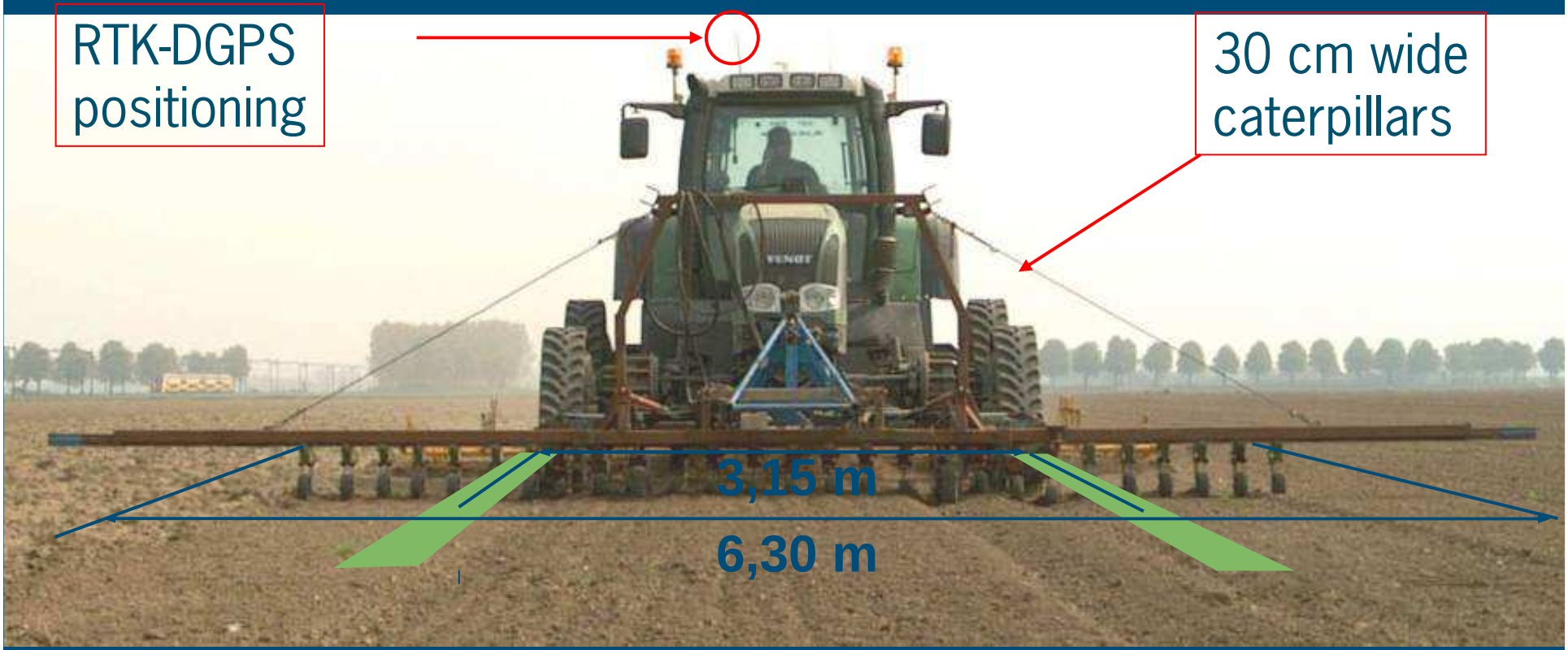

Frost ruggen


Ruggen Vlak

voorjaar 2007

Zomertarwe 2007

Controlled Traffic System



Pr Permanent onbereden bedden + minimaal bewerken (CTF+CTmin)

- Doelstellingen CTF+CTmin
  - Grond in bedden geheel niet meer berijden en minimaal bewerken; alleen niet-kerend bewerken indien storende laag ontstaat.
  - Zelfde doelstellingen als conserverende bewerking
  - Tijd- en kostenbesparing
- Doelstelling project
  - Vergelijking CTF+CTmin met seizoensrijpaden + conventioneel bewerken.

Project Rijpaden Flevoland

SCTF+Conventioneel
(spitten, ca. 18 cm)

CTF+minimaal
(schijveneg, ca 7 cm)

Januari 2008

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Conservation Agriculture

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CA and climate change:

- mitigation through emission reductions (fuel, N_2O, CH_4)
- mitigation through carbon sequestration up to 0.2 $t \cdot ha^{-1} \cdot y^{-1}$ C
- adaptation through better drought tolerance
- adaptation through better water infiltration (less flooding)

Advantages for the farm:

- Higher yields. 0-30%
- Input savings (N fertiliser, pesticides)
- 50% saving in machine capital (tractors)
- 3-fold lifetime of tractors
- 40% smaller tractors
- 50% labour saving
- 70% fuel saving


VALMET

Pest management in CA:

- Establishment of new balance takes 2 years
- Crop rotations and mulch cover provide elements for natural pest and disease control (IPM)
- Healthier soil = healthier plants
- Pesticide use is after change to CA not higher than conventional
- Over the long term pest and disease problems decrease (less pesticides)
- Pesticide use must not interfere with biological processes in the system

Weed management in CA:

- First two years critical when changing over
- General rule: avoid weeds to mature, avoid fallow/open soil surface; let seedbank decay
- Mulch cover, cover crops, crop rotations are the main tools for weed management
- Herbicides are useful for sanitation
- Herbicide use at beginning is equal or slightly increased, declining over time
- CA without herbicides is possible

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BASIS Broekemahoeve Applied Soil Innovation Systems

- Combination of controlled Traffic and reduced tillage
- Organic:
- Integrated systems

CA in the Netherlands?

- Erosion doesn't play a dominant role in NL
- CA mostly used in rotations of mowing crops
- Most results are in extensive agriculture
- Motivation for NL is soil quality, system stability, climate change, water, biodiversity, costs

Challenges:

- Root crops
- Crops with small/vulnerable seeds
- Weed control
- Set back in conversion years

BASIS: Broekemahoeve Applied Soil Innovation Systems

- Conventional farming system
  - 2009: sugarbeet, barley
- Organic farming system
  - 2009: wheat, seed potato, carrot
- 3 tillage systems
  - Conventional tillage (plough)
  - Not ploughing
  - Minimal tillage (also direct seeding)

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What data do we collect?

- Standard (yield, soil analysis (N, P, K etc)
- Greenhouse gasses
- Biodiversity (Earthworm)
- Soil water
- Soil temperature
- Energy input
- Water infiltration
- Nitrate leaching
- Weeds, Pests and diseases

Thank you very much for your attention!!