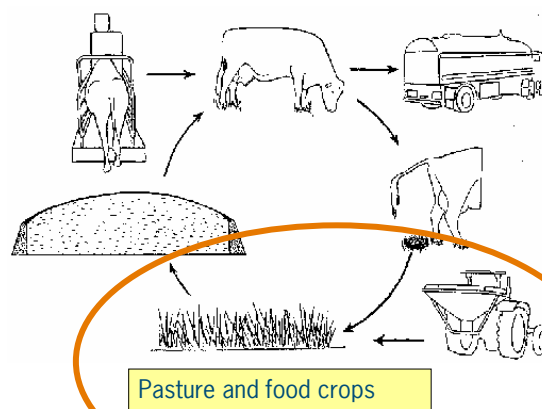


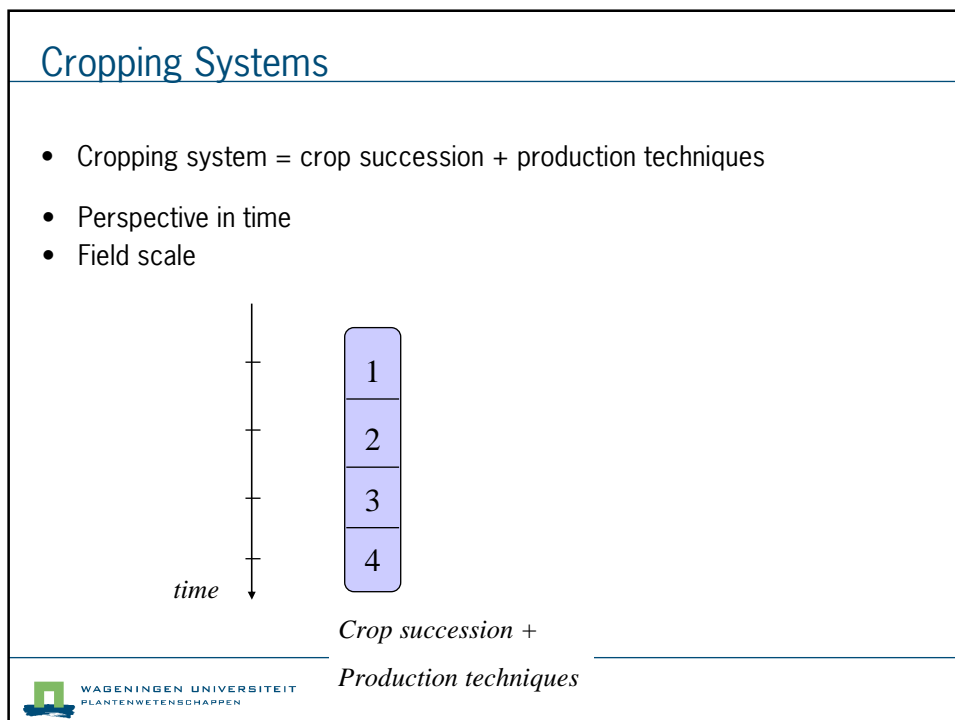
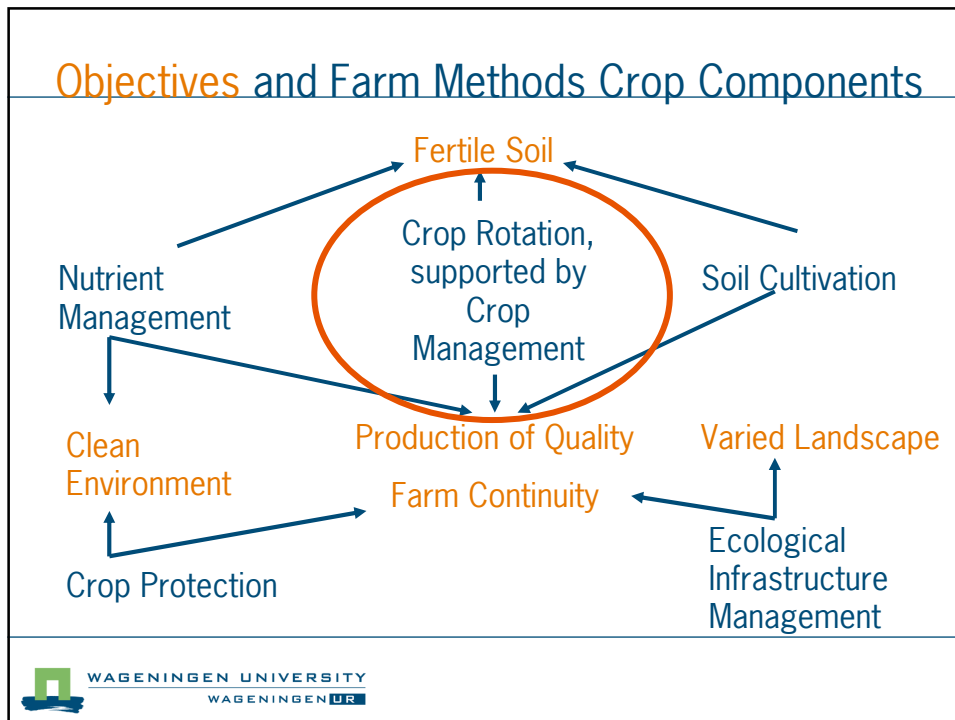
Prototyping example: growing a healthy crop

Walter Rossing, Biological Farming Systems



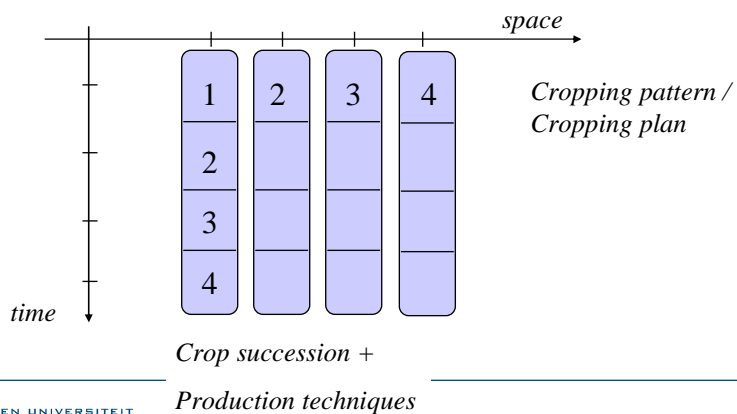
Crops as Component in Farming Systems





From cropping systems to farming systems

- Farming system = cropping systems + interrelations through management
- Perspective in time versus perspective in space
- Field scale versus farm scale
- Role of farm management: deviations from the 'theory'



Cropping Systems: both goal and means

'Dreams' & objectives of farmer;
motivation, skills



Values and norms of society



Farming systems

- Different fields
- Conventional, integrated, organic
- Bulk production, quality production
- Direct sale to consumer, wholesale
- Collaboration with other farms?
-



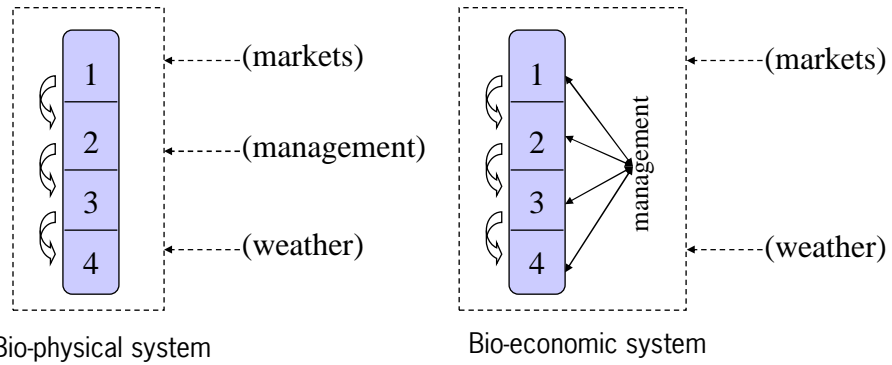
Cropping systems

- Wheat mono 1,...,n
- W-OSR 1,...,m
- W-W-OSR 1,...,p
-

Goal of study and means of mgt:
systems approach needed

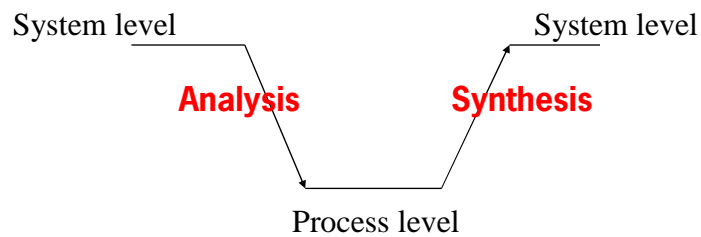
Systems approach

System: delimited part of reality with interacting components, which is affected by the environment, but does not affect the environment



Systems approach (2)

Phenomena at the system scale can be explained from knowledge at the process scale



'Opposite' of systems approach: correlative / descriptive approach

Why crop successions?

Chemical soil fertility

- optimal use of nutrient resources
- reduction of mineral losses

Physical soil fertility

- maintenance of soil structure (cover and rooting)

Biological soil fertility

- prevention of weed problems
- suppression of pests and diseases

Chemical soil fertility (1)

Crops differ strongly in

- nutrient demand
- nutrient utilization (in time and space):
 - N recovery wheat: 0.7, tulip: 0.4

Nutrients are available from

- manure
- leguminous crops (nitrogen)
- release from organic matter (nitrogen)
- artificial fertilizer
- atmospheric deposition

Chemical soil fertility (2)

Differences in nutrient demand and supply as a management challenge

- alternate high and low demanding crops
- alternate N-fixing and N-demanding crops
- consider transfer to next year

Chemical soil fertility (3)

Nitrogen demand

High:

- cabbage
- potato
- leek
- celery

Medium:

- onion
- grains
- leafy crops
- maize

Low:

- carrot
- pea
- chicory
- grass-clover
- *barley*

Physical soil fertility (1)

Ground coverage

Good:

- grains
- grass-clover
- sugar beet
- cabbage

Medium:

- potato
- pumpkin
- maize
- leafy crops
- beans (haricots)

Poor:

- onion
- leek
- red beet
- carrot
- celery

Physical soil fertility (2)

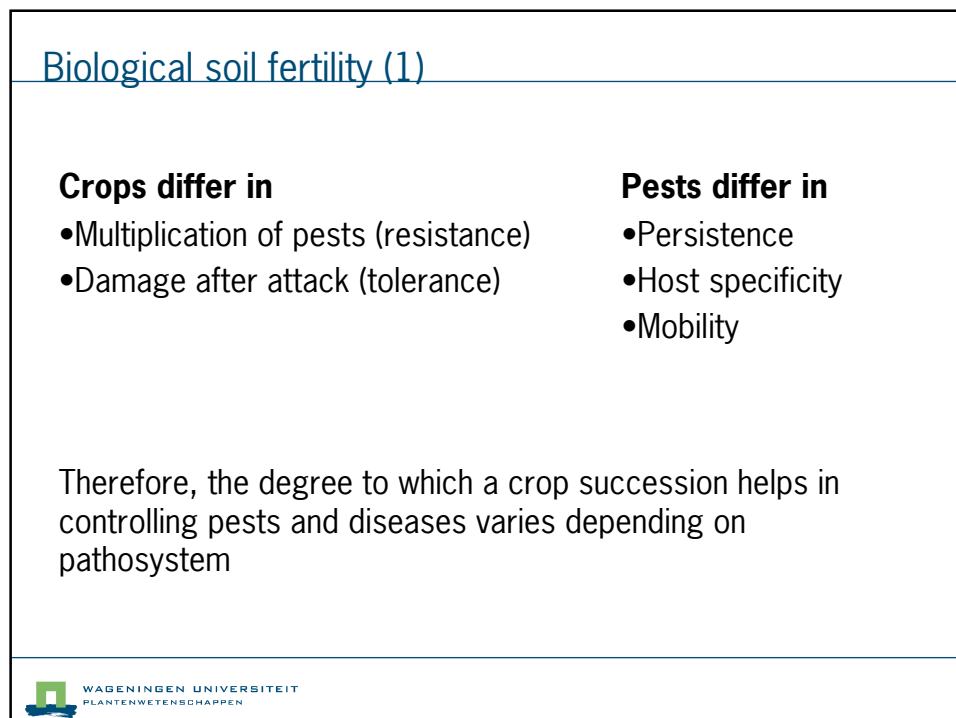
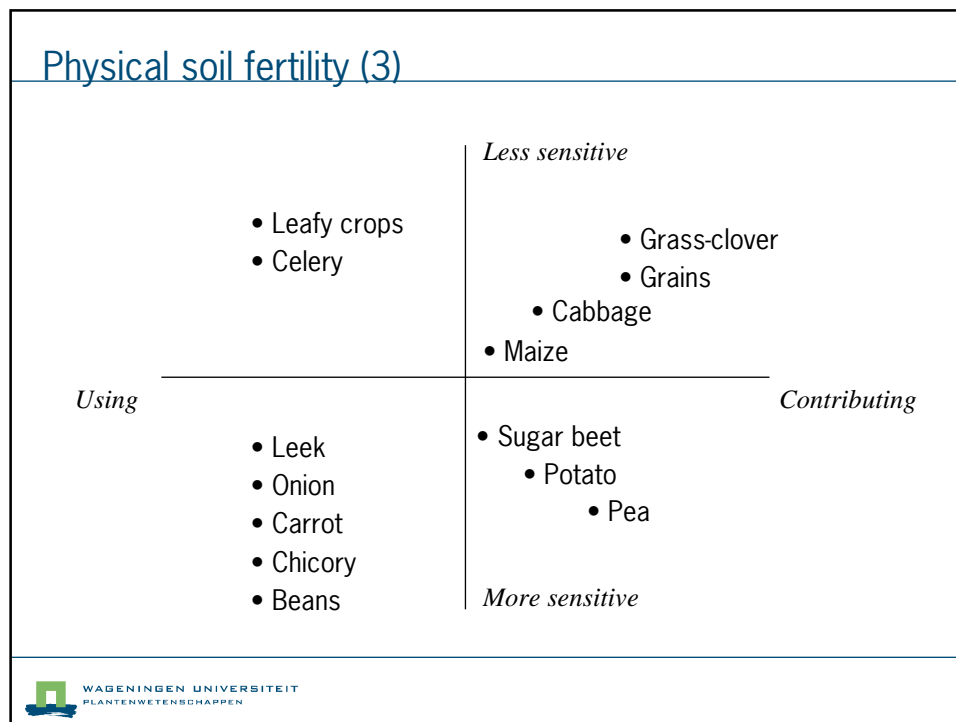
Rooting

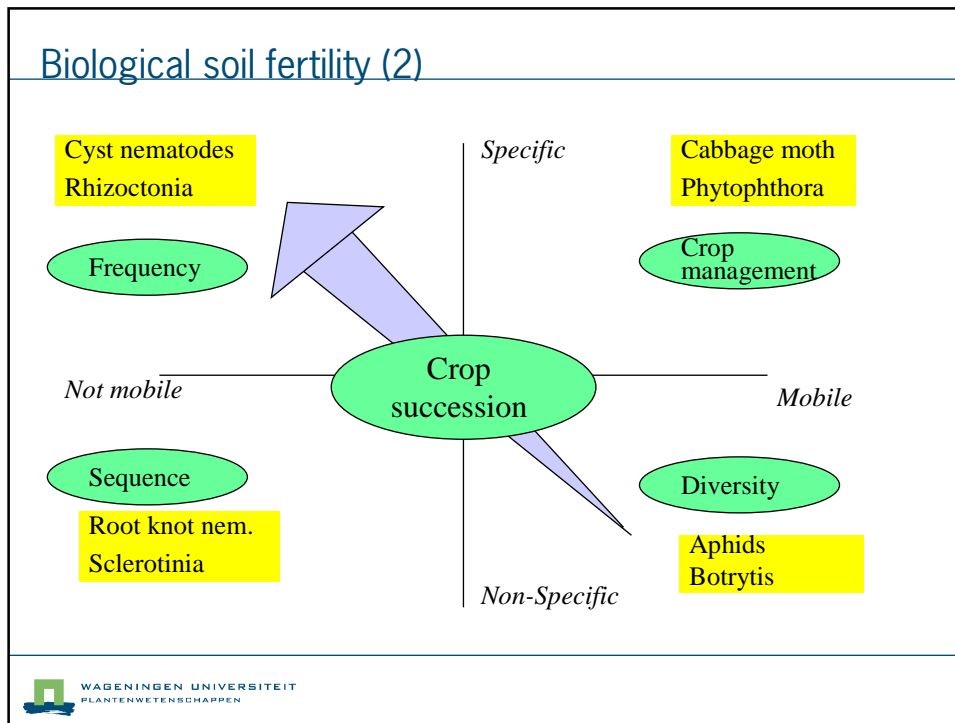
Good:

- grains
- grass-clover
- leek
- cabbage
- maize
- sugar beet
- cabbage
- carrot

Poor:

- pumpkin
- peas and beans
- leafy crops
- onion
- potato

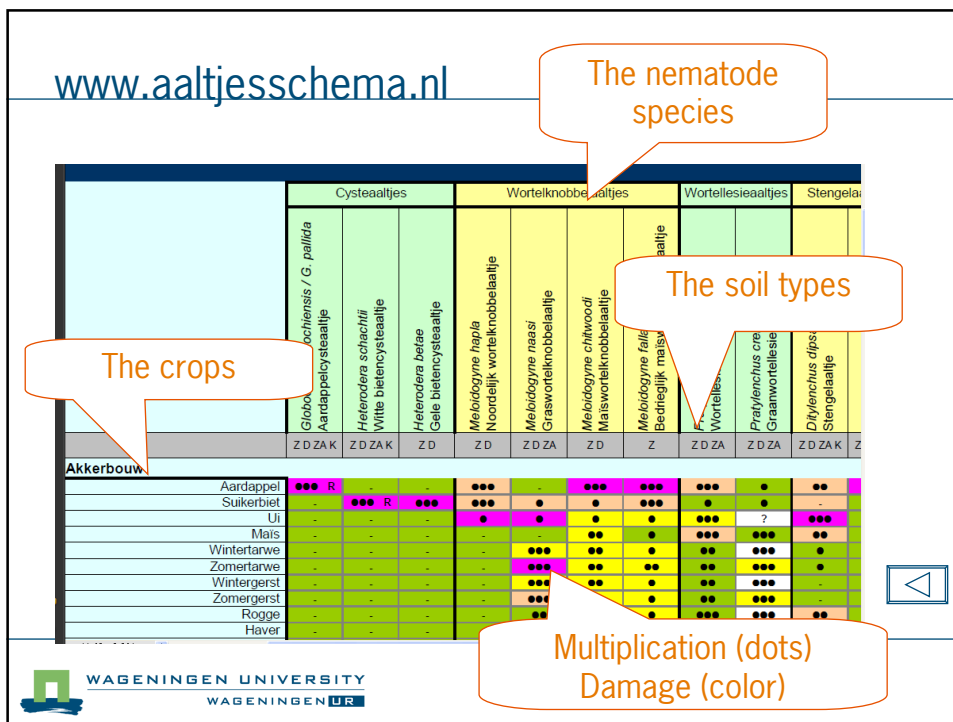




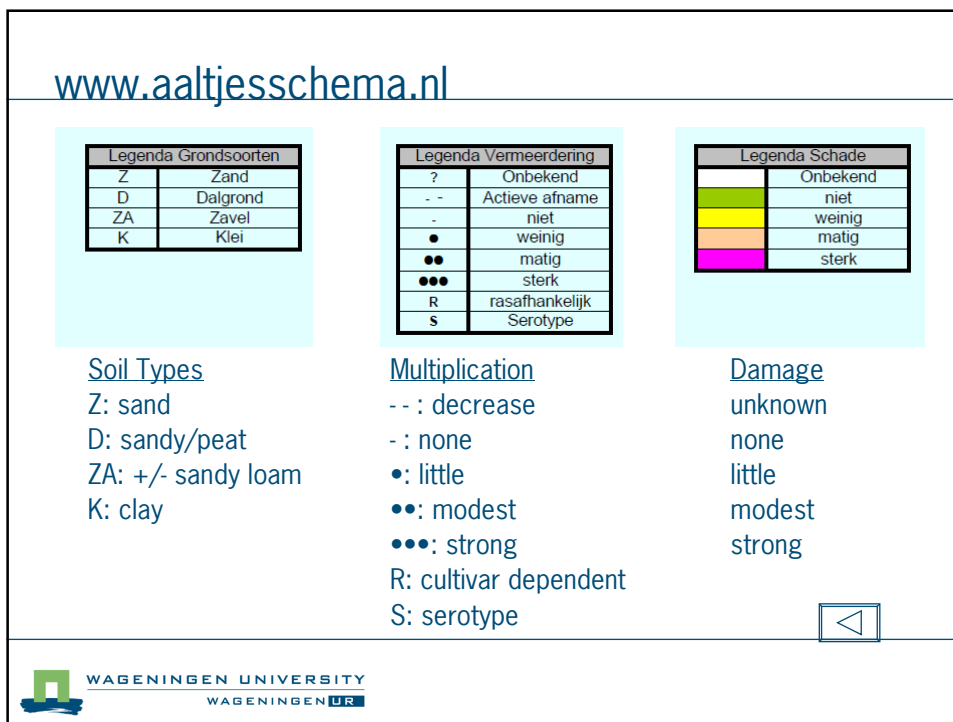
Summary: Ecological Samba

Example crop rotation safe crop frequencies	Control of weeds farmer/crop	Support of soil structure farmer/crop	N supply farmer/crop
Mown crops N-fixing (e.g. grass-clover)			
Root crops High N-demand (e.g. potato)			
Mown crops High N-demand (e.g. wheat)			
Root crops Low N-demand (e.g. carrot)			
Mown crops Low N-demand (e.g. barley)			
Root crops Avg N-demand (e.g. onion)			

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Let's do an exercise

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