

Redefining the field

Towards more crop diversity

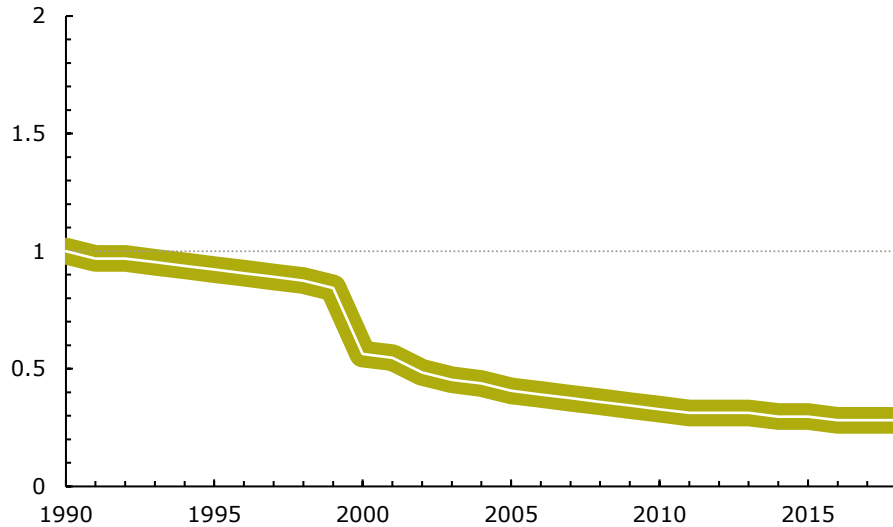
Dirk van Apeldoorn

Farming Systems Ecology Group en Praktijkonderzoek Openteelten



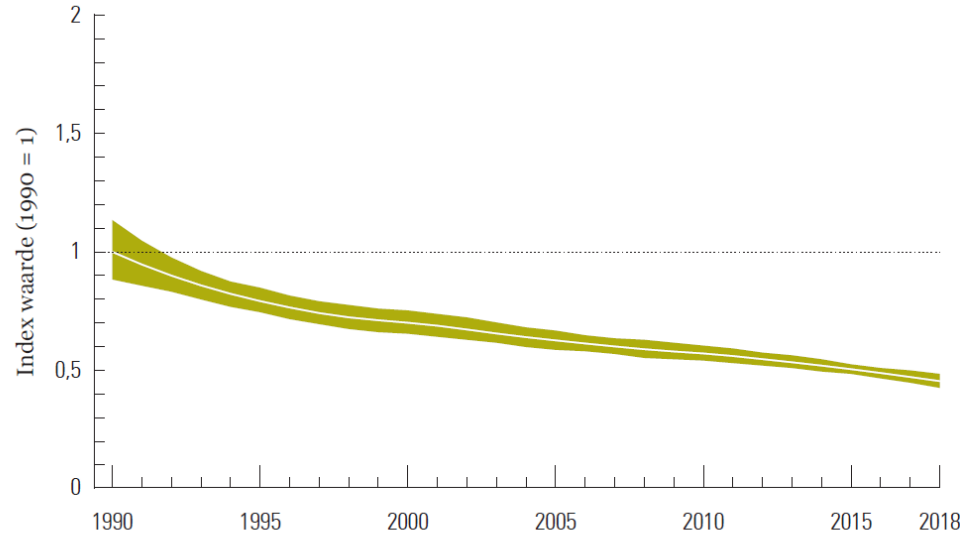
About me: Bending the curve

Farmers in the NL



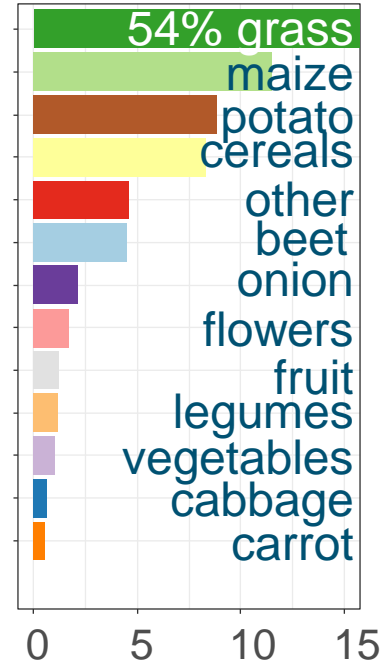
CBS: [statline](#)

Biodiversity in rural areas in NL



WWF: [Living Planet Report Nederland](#)

Too big and few species

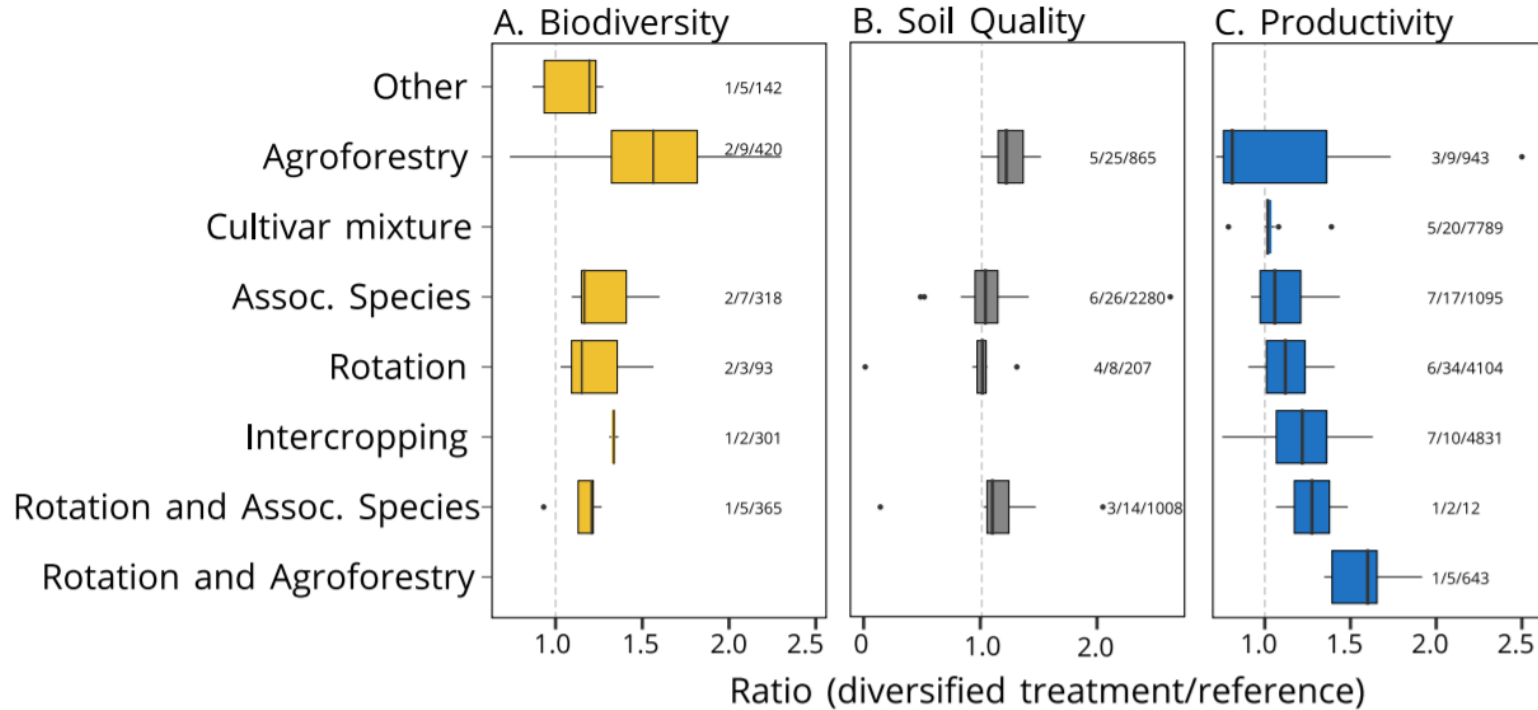


Trends in Ecology & Evolution

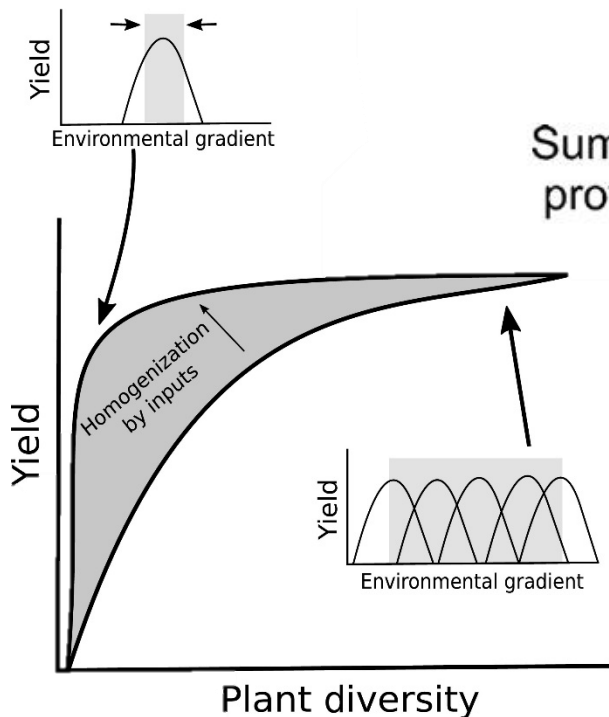
Opinion

Beyond organic farming – harnessing biodiversity-friendly landscapes

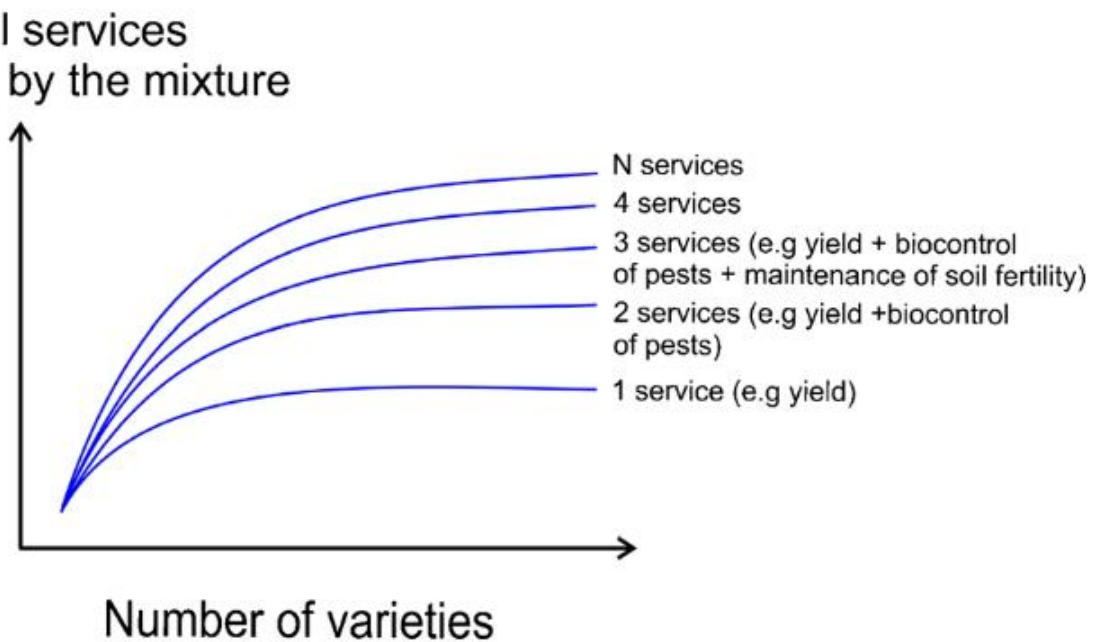
Diversity works!



Ecological intensification: smart use of diversity

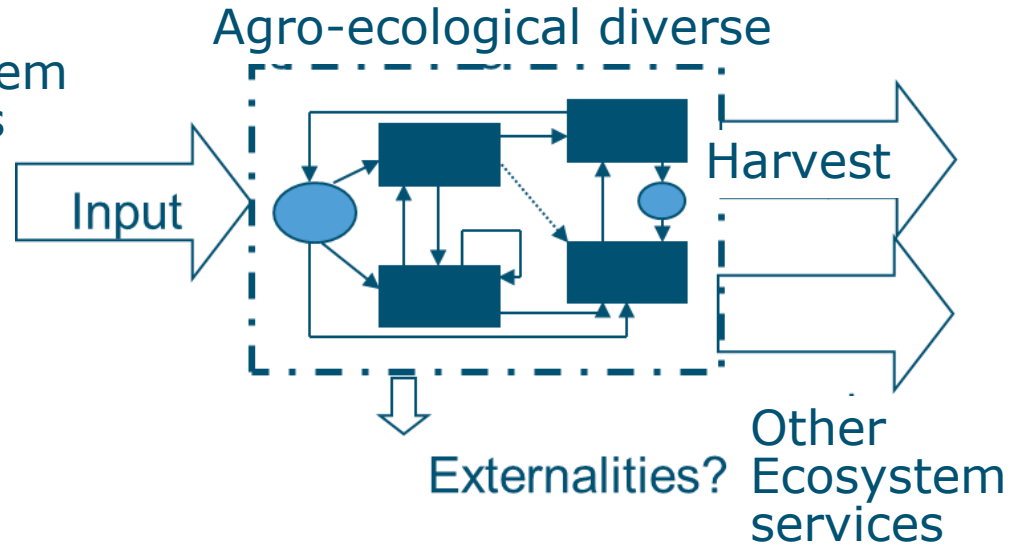
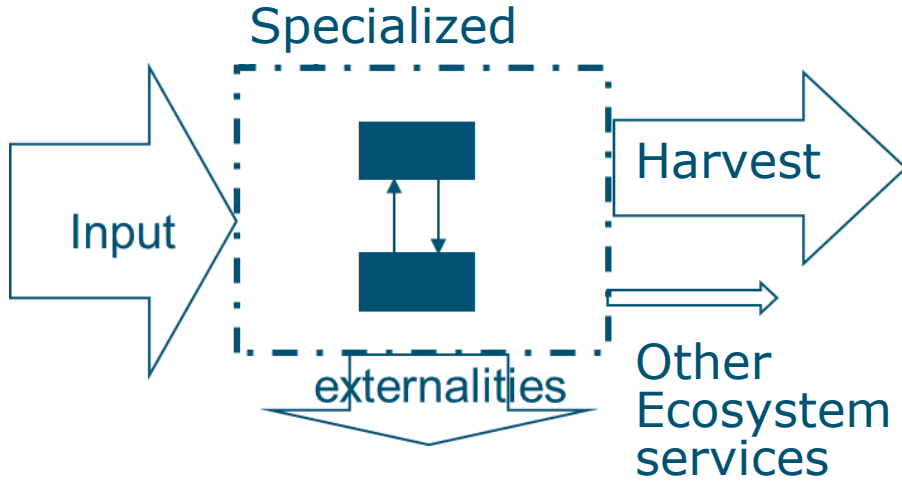


Forest et al (2017).
doi:10.1111/1365-2745.12789.



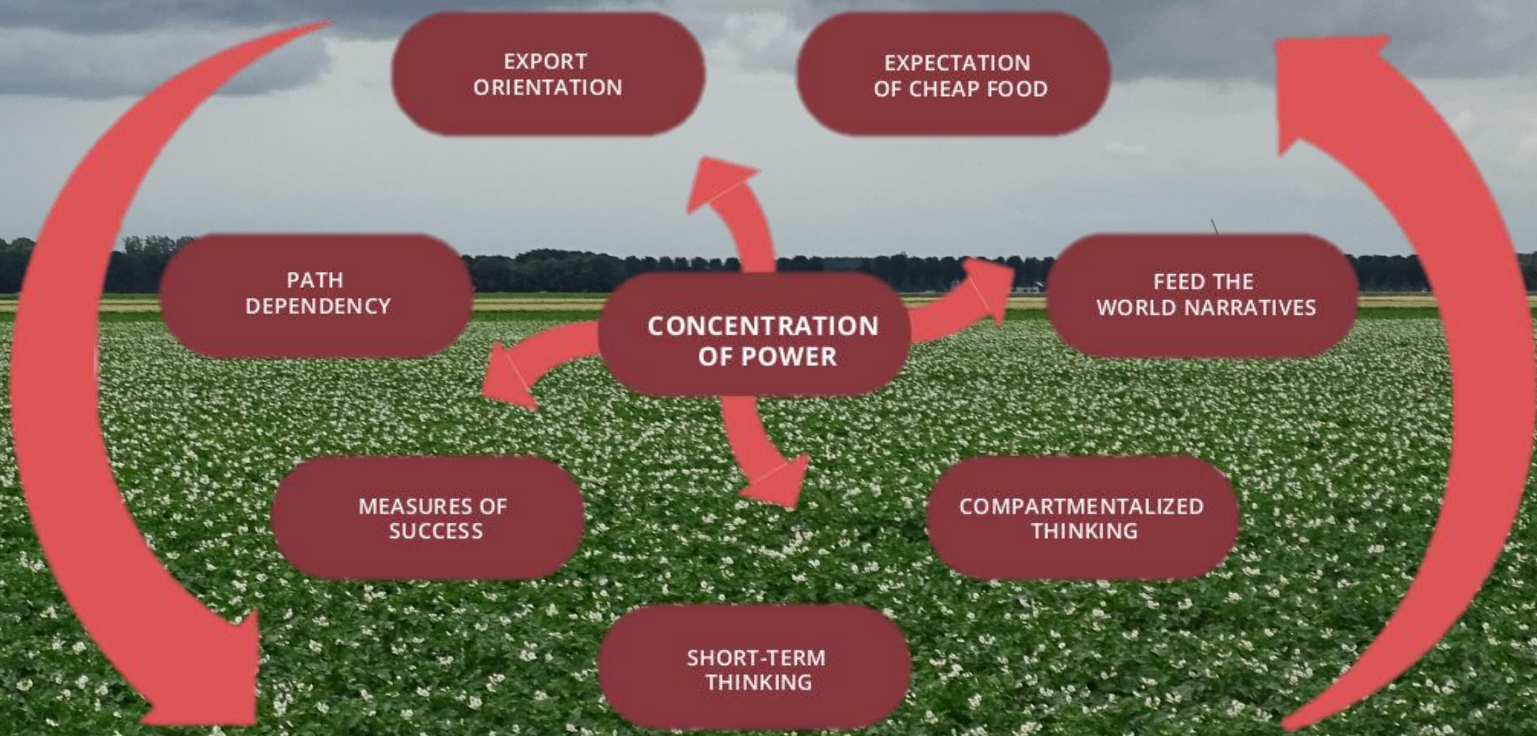
Barot, et al. (2017).
doi.org/10.1007/s13593-017-0418-x

Diversified systems have multi-objectives



Walter Rossing

Industrial agriculture is locked-in



Strip cropping, diverse intensive agriculture



Optimal strip width for ES

yield

Pest & diseases

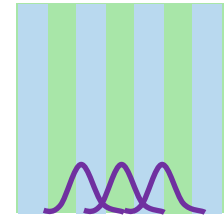
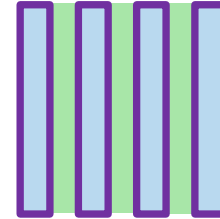
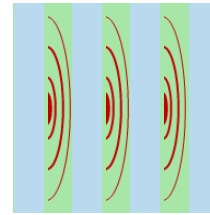
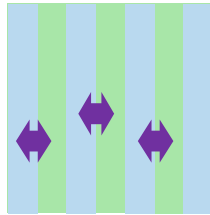
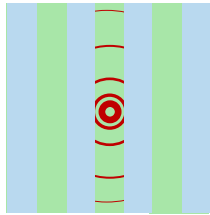
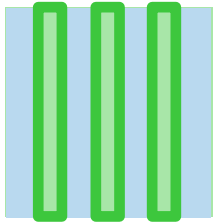
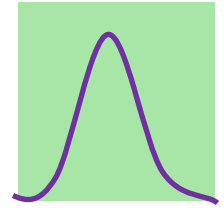
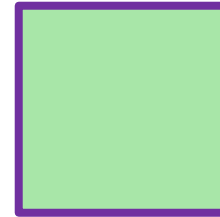
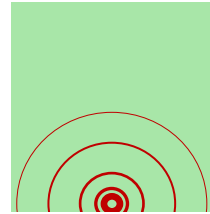
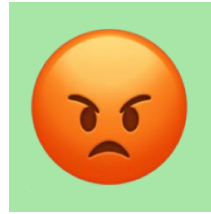
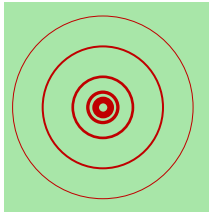
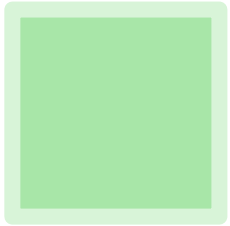
Mechanisation

society

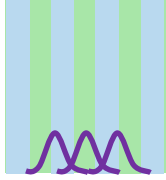
Bio-control

Biodiversity

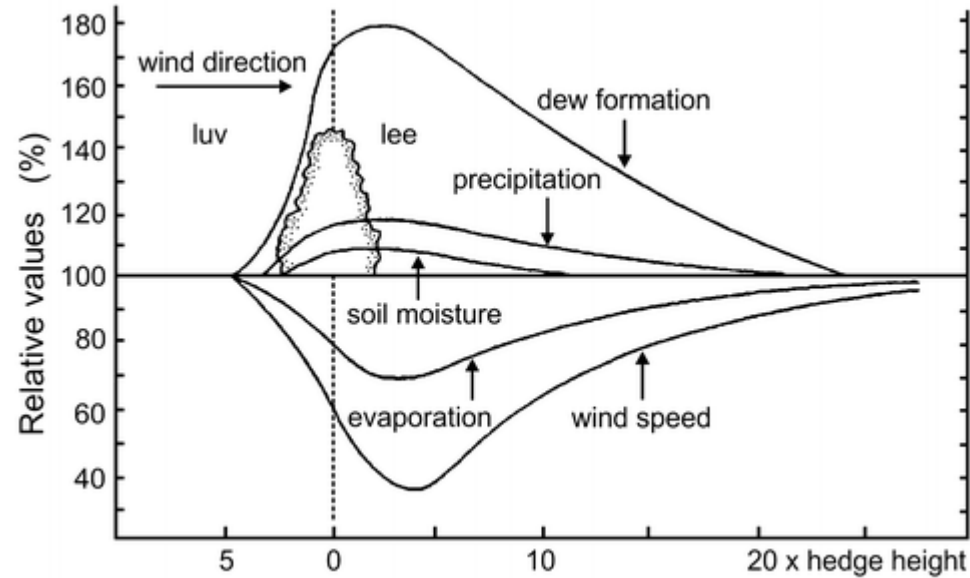
Robustness

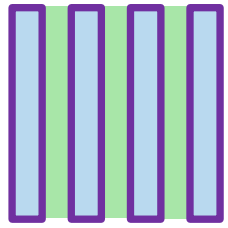


Stripwidth

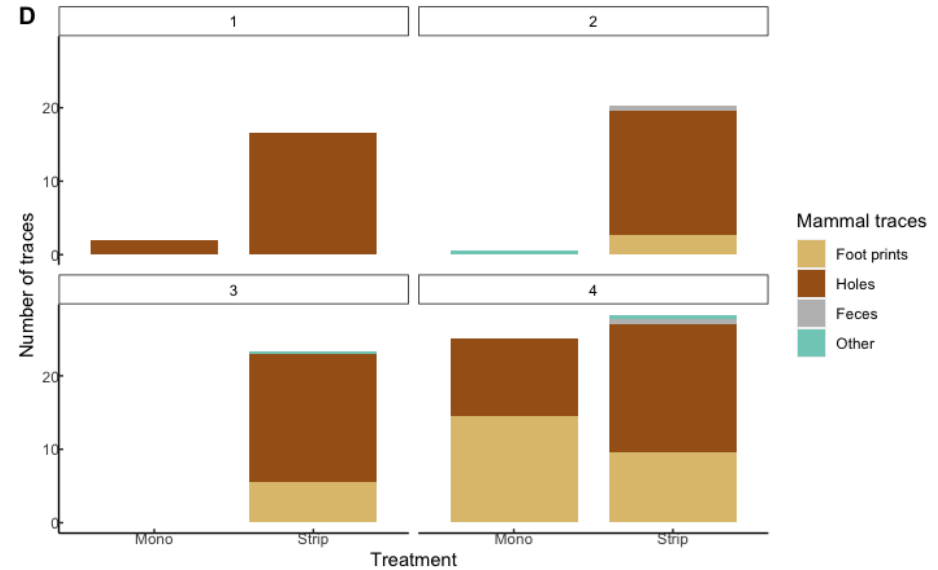
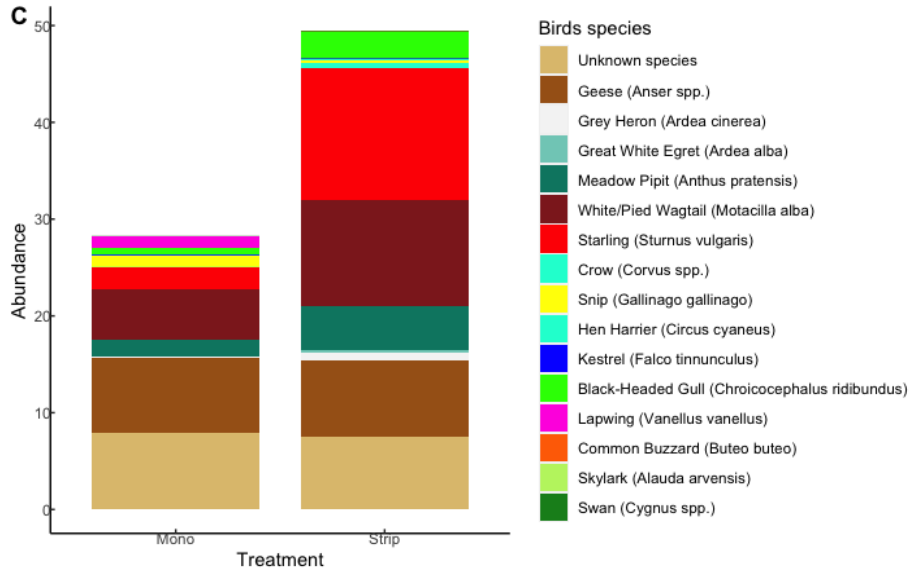


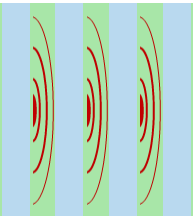
Change the microclimate and hedge your bets



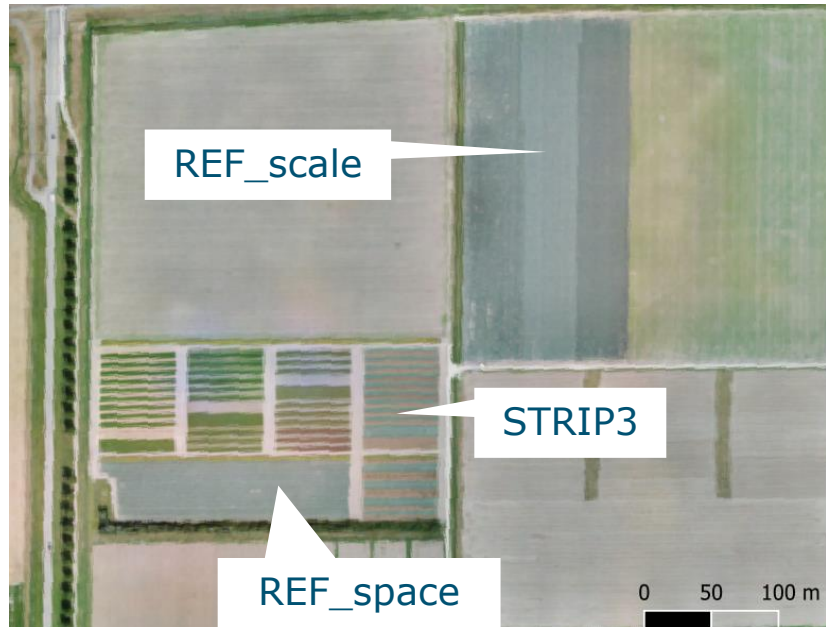
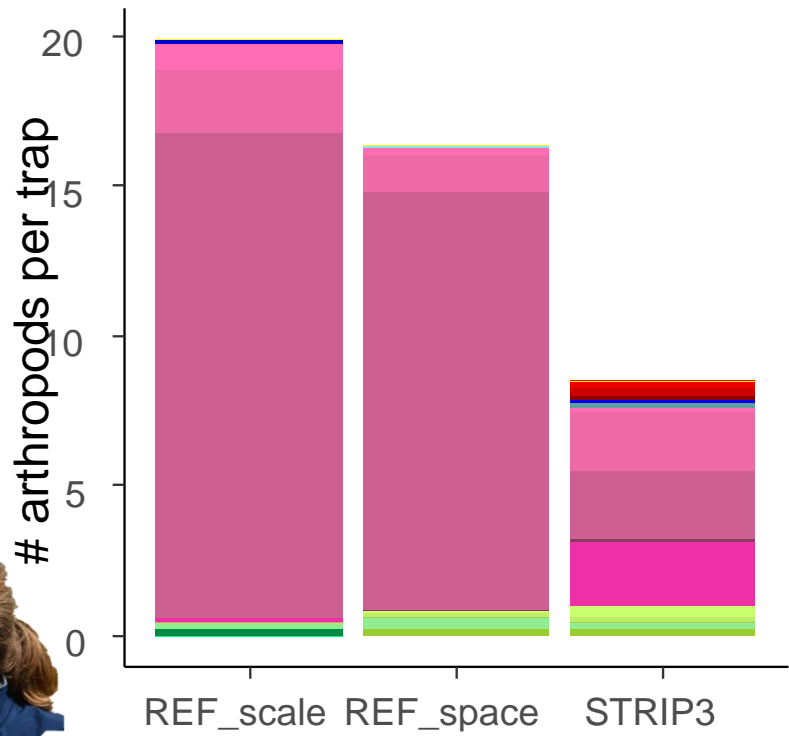


Biodiversity in the fields rather than the margin





Monocultures cause pests and have no control

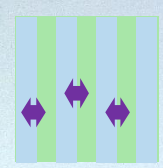




New relations between farm, landscape and consumer



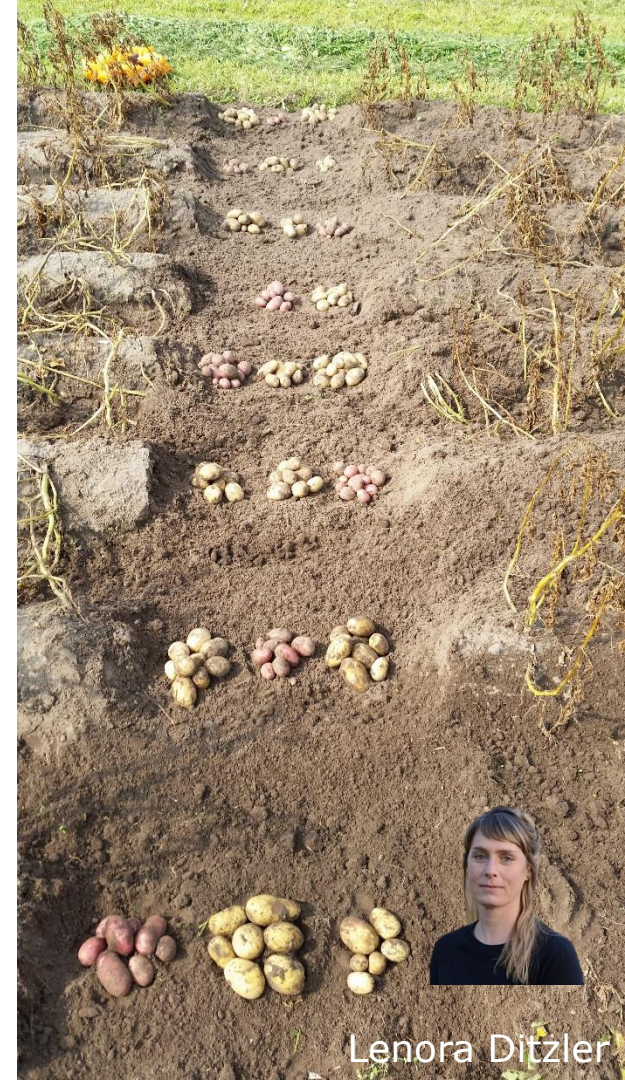
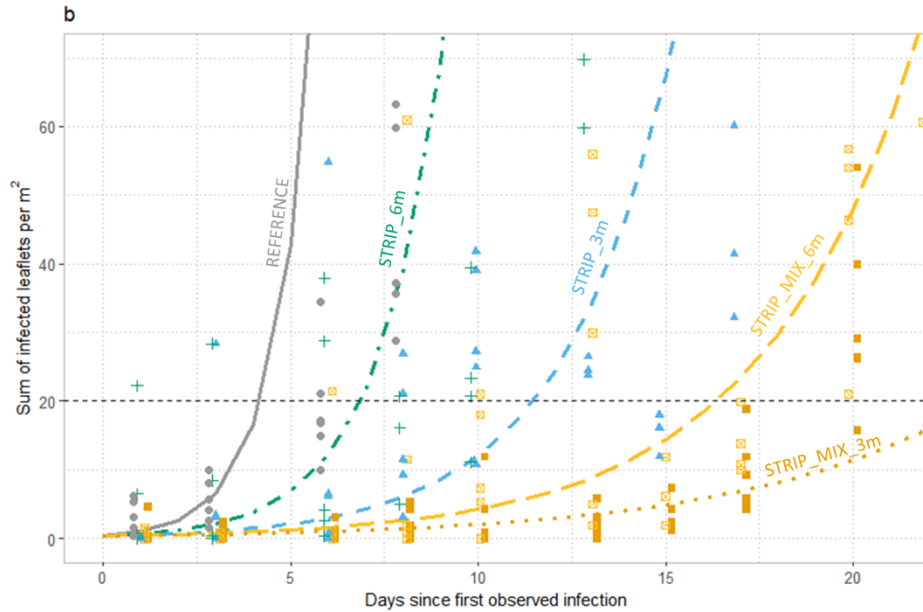
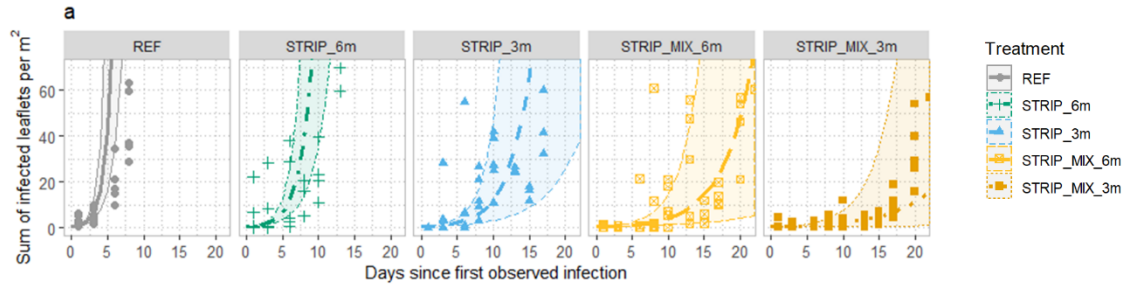
Heaviest loads on strongest soils



social distancing for crops



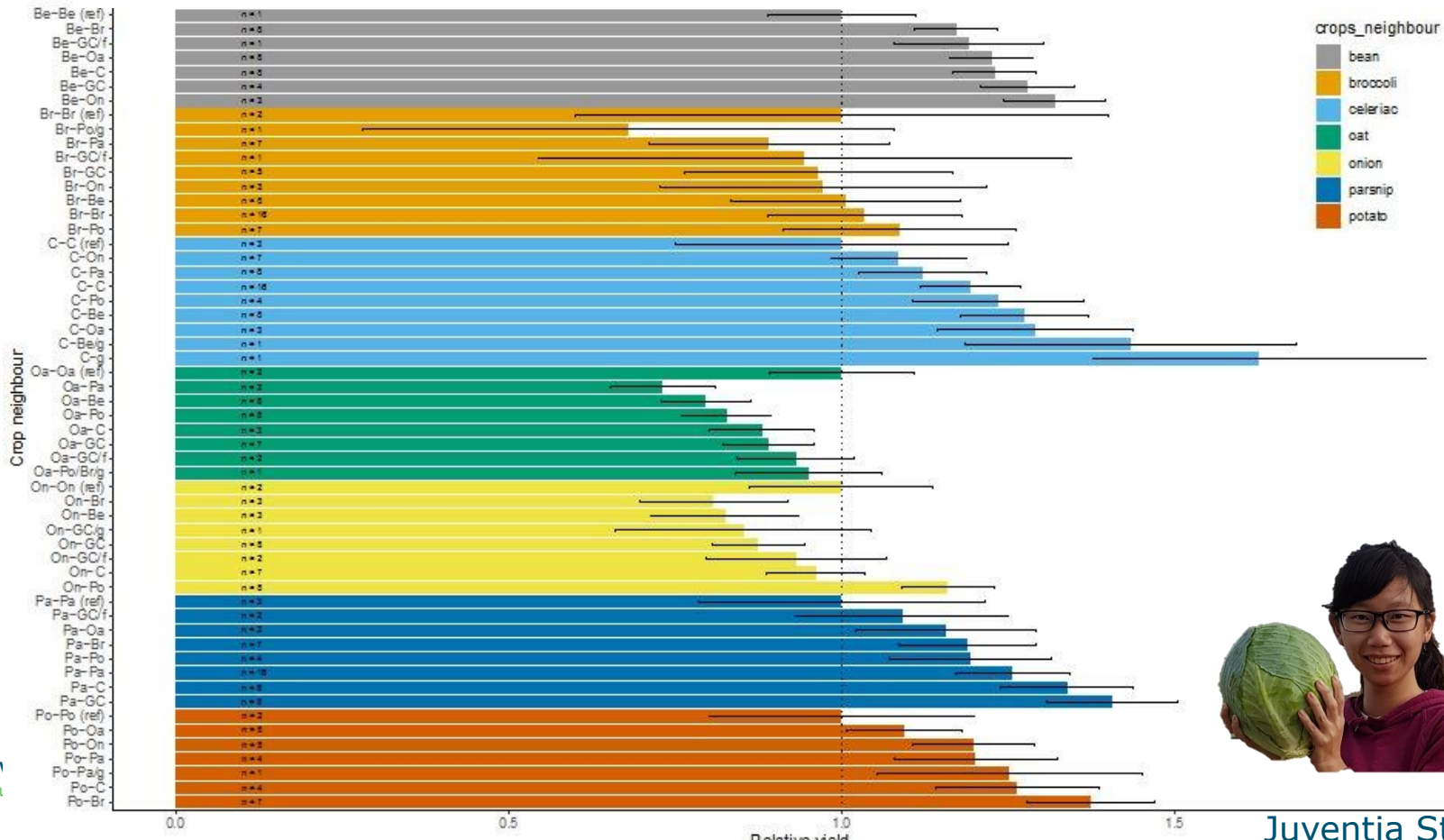
Flattening the curve



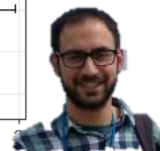
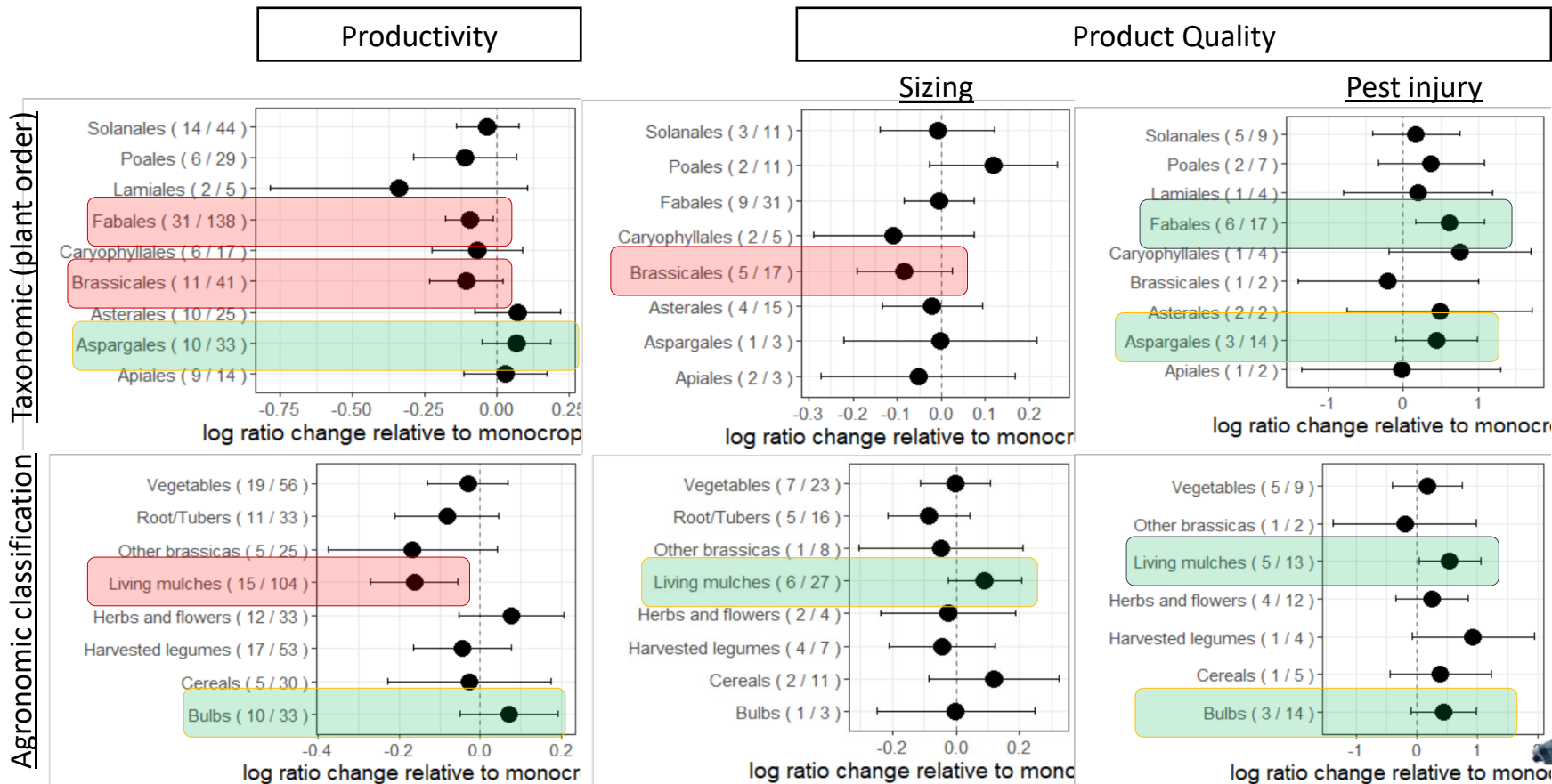
Lenora Ditzler



What makes good combinations



Objective determines good combinations

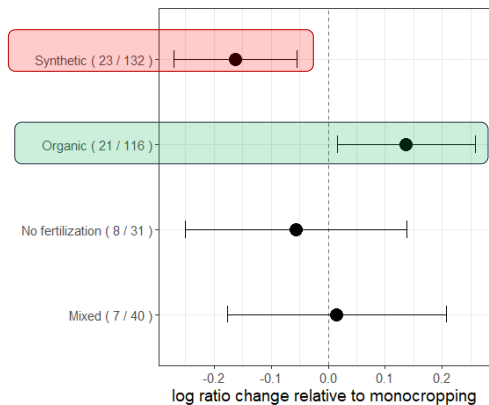


Javier Carrillo

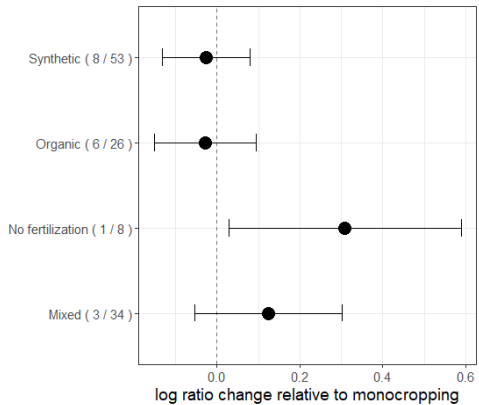
Objective determines good combinations

Type of fertilizer

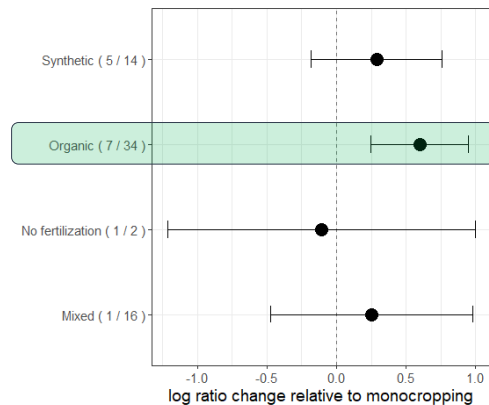
productivity



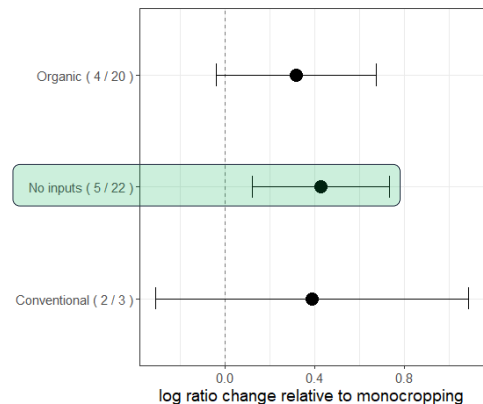
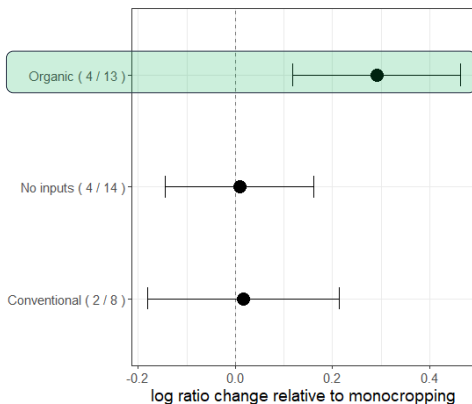
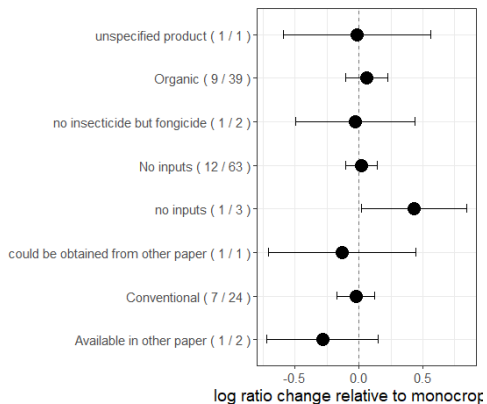
Sizing



Pest injury

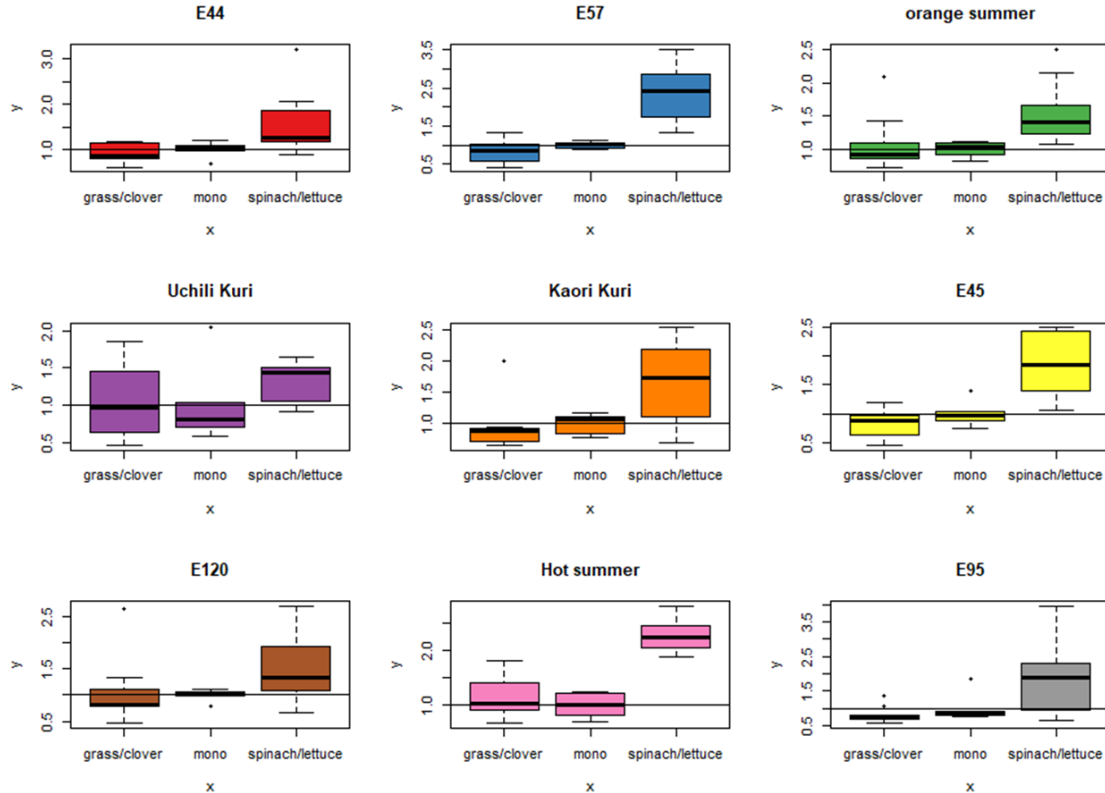


Type of pesticide



what traits are needed?

Pumpkin (intercropping index)



Crop(Variety) X Crop(Variety)

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|---------------|--------|---------------|---------------|-------|---------------|-------|----------|--------|----------|----------|----------|---------------|----------|--------|----------|--------|----------|--------|--------|-------|--------|--------|--------|--------|--------|---------------|--------|--------|---------------|--------|--------|------|
| | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m | 1.5m |
| | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back | Back |
| | Orange summer | Admir | Hot summer | Orange summer | PR1 | 21EU14 | PR3 | PR1 | CF802 | PR3 | E68F0118 | Preludeo | Hot summer | E68F0118 | CF802 | E68F0138 | PR1 | E68F0138 | Admir | Animix | PR2 | Animix | CF802 | Admir | Balboa | CF802 | Hot summer | CF802 | CF802 | Hot summer | CF802 | | |
| | 21EU14 | Animix | Orange summer | 21EU14 | PR2 | Hot summer | PR1 | E68F0118 | 21EU14 | E68F0138 | Balboa | E68F0138 | PR2 | E68F0138 | Alonix | CF797 | Animix | CF802 | Balboa | Animix | PR1 | Admir | Balboa | Animix | CF797 | Animix | CF797 | 21EU14 | Balboa | CF797 | 21EU14 | Balboa | |
| | Hot summer | Alonix | Hot summer | Orange summer | PR1 | Orange summer | PR3 | PR1 | CF802 | PR2 | Preludeo | E68F0138 | Orange summer | E68F0138 | CF802 | Preludeo | PR3 | E68F0138 | Animix | Alonix | PR3 | Alonix | CF797 | Alonix | CF802 | Balboa | Orange summer | CF797 | Balboa | Orange summer | CF797 | | |
| | Orange summer | Animix | 21EU14 | 21EU14 | PR3 | Hot summer | PR1 | PR2 | Balboa | PR2 | E68F0118 | E68F0138 | Hot summer | Preludeo | Balboa | E68F0138 | PR2 | Preludeo | Alonix | Alonix | PR2 | Animix | CF802 | Animix | Balboa | CF802 | Hot summer | Balboa | CF802 | Hot summer | Balboa | | |
| | 21EU14 | Admir | Orange summer | Hot summer | PR3 | 21EU14 | PR2 | PR3 | CF797 | PR1 | Preludeo | Preludeo | Orange summer | E68F0118 | CF797 | Preludeo | PR3 | E68F0138 | Animix | Admir | PR3 | Admir | CF797 | Admir | CF802 | Balboa | Orange summer | CF797 | Balboa | Orange summer | CF797 | | |
| | Hot summer | Alonix | 21EU14 | Hot summer | PR2 | Orange summer | PR3 | PR1 | Balboa | PR2 | E68F0138 | Alonix | 21EU14 | Preludeo | Balboa | E68F0138 | PR1 | E68F0138 | Admir | Animix | PR2 | Animix | CF802 | Alonix | Balboa | CF797 | Hot summer | Balboa | CF797 | Hot summer | Balboa | | |
| | Orange summer | Admir | Orange summer | Orange summer | PR2 | Orange summer | PR2 | PR3 | Balboa | PR2 | CF797 | E68F0118 | Orange summer | E68F0138 | CF797 | E68F0138 | PR3 | Preludeo | Alonix | Alonix | PR1 | Alonix | Balboa | Animix | CF802 | CF802 | 21EU14 | CF802 | CF802 | 21EU14 | CF802 | | |
| | 21EU14 | Admir | Hot summer | 21EU14 | PR3 | 21EU14 | PR1 | PR3 | CF802 | PR1 | Orion | E68F0138 | Hot summer | Preludeo | CF797 | E68F0138 | PR2 | E68F0138 | Admir | Admir | PR3 | Admir | CF797 | Admir | CF802 | Balboa | Orange summer | CF797 | Balboa | Orange summer | CF797 | | |
| | Hot summer | Alonix | 21EU14 | Hot summer | PR2 | Hot summer | PR2 | PR2 | CF797 | PR2 | Orion | E68F0118 | 21EU14 | E68F0138 | CF797 | Preludeo | PR1 | Preludeo | Animix | Animix | PR1 | Alonix | Balboa | Alonix | CF797 | CF797 | 21EU14 | CF802 | CF797 | 21EU14 | CF802 | | |
| | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | Front | | |
| Strip no | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |

#field layout 33 strips (140m x 1.5m). Total field area 1 ha
 #crops pumpkin, cauliflower, fennel, lettuce, grass-clover, leek
 #irrigation subsol at 0.40m, 2 pipes per strip, 1 pump with control station. Field is divided in 2 parts.
 #weather station for : rain, wind, soil temperature, soil moisture and air temperature
 #soil analysis (October 2020)
 #field sown with winter rye (November 2020-second half of April 2021)
 #spread compost 30 tonnes/ha before sowing
 #grass-clover density ratio = 30:5 kg/ha

Beds raised at 13/5/2021
 Soil sampling at 17/5/2021

| Crop | Rows | Between rows | Within rows | Sowing date | Planting date |
|--------------|------|--------------|-------------|-------------|---------------|
| Pumpkin | 2 | 75 | 75 | 2021-06-03 | |
| Cauliflower | 2 | 75 | 60 | 2021-07-09 | |
| Fennel | 4 | 32 | 32 | 20-07-2021 | |
| Lettuce | 4 | 32 | 32 | 2021-07-27 | |
| Leek | 2 | 75 | 115 | 2021-09-26 | 2021-07-07 |
| Grass-clover | | | | 2021-06-01 | |

| | | | |
|--------------|------------|---------------|----------|
| Pumpkin | Hot summer | Orange summer | 21EU14 |
| Leek | PR1 | PR2 | PR3 |
| Lettuce | Admir | Alonix | Animix |
| Cauliflower | Balboa | CF797 | CF802 |
| Grass-clover | | | |
| Fennel | Preludeo | E68F0118 | E68F0138 |

Bending the curve

- All farmers report more joy
- Diversity begets diversity
- We can start now

Thanks to:

Walter Rossing, Lenora Ditzler,
Luuk Croijmans, Fogelina
Cuperus, Stella Juventia, Javier
Carrillo Reche, Titouan Le Noc
and many many students

