

National Monitoring Program Food Forests

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Nationaal Monitoringsprogramma

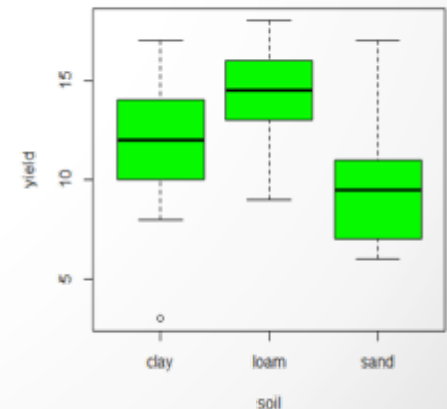
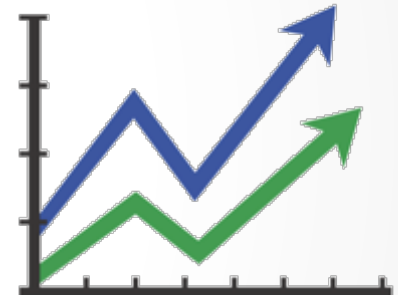
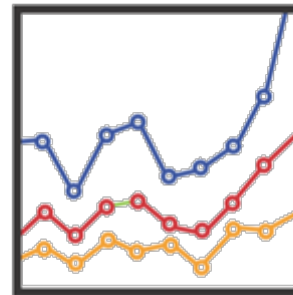
Voedselbossen



Goal

1. Investigate **trends & variation** in:

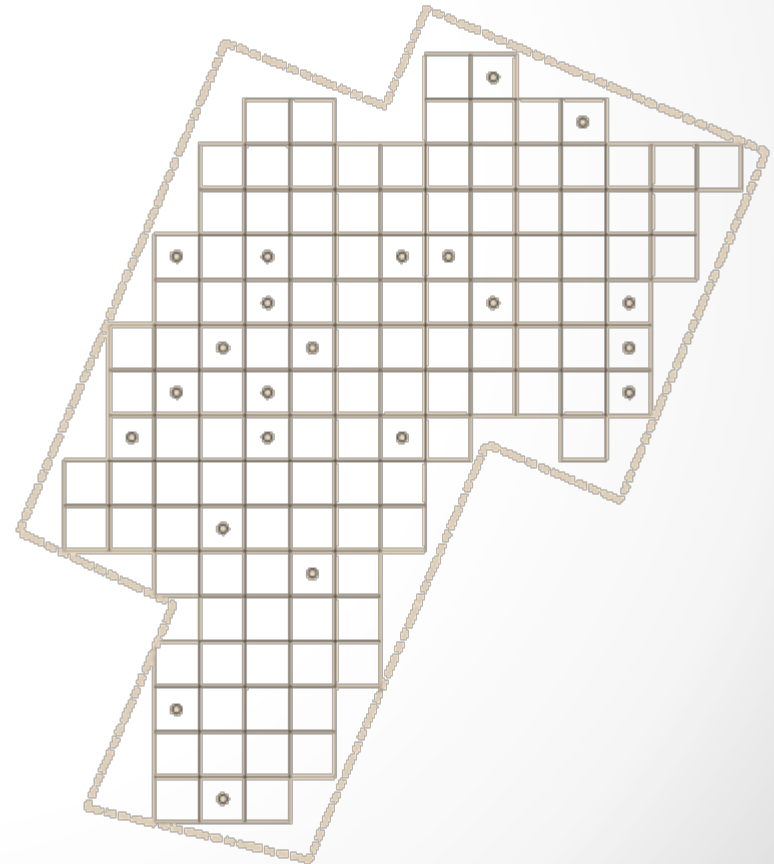
- Soil health
- CO₂ fixation
- Biodiversity
- Vegetation structure
- Yield, labour, profitability
- Social impact



Goal

2. Standardised, systematic, long-term monitoring:

- Same indicators
- Same methods
- Annual or biannual
- Participatory when possible
- Online data platform
- Minimum 5 years



Goal

3. **National network:** 27 Dutch Food Forests:

- Building up evidence together
- Knowledge exchange
- Evaluating and improving practises

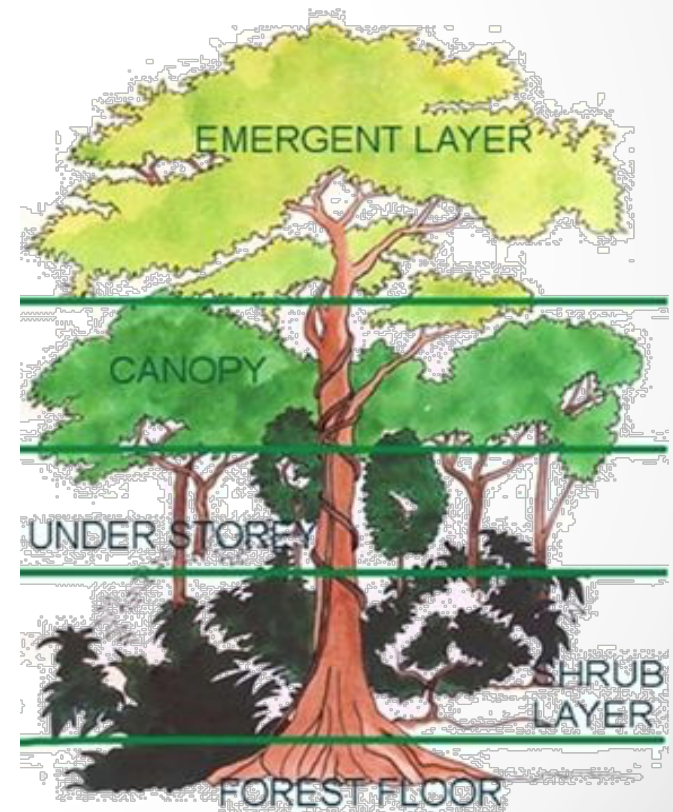


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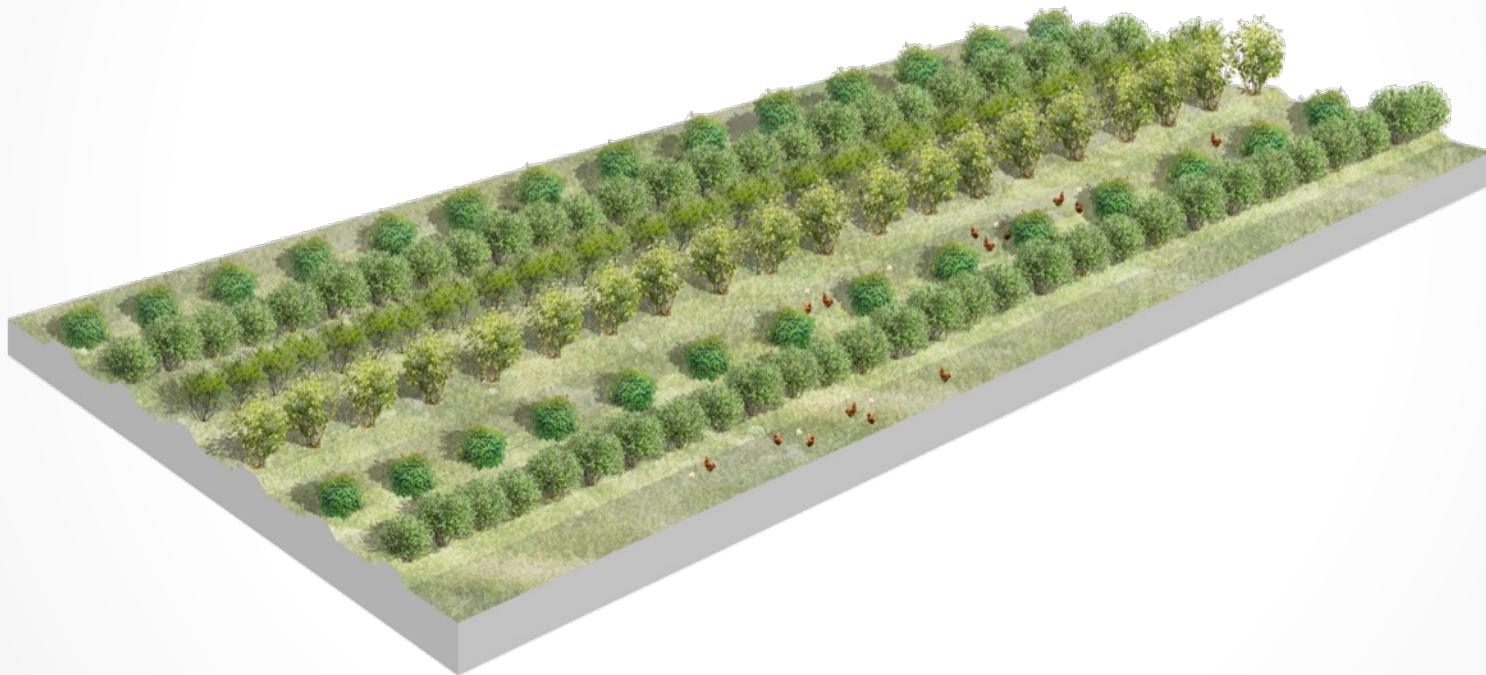
[illegible]

Prerequisites

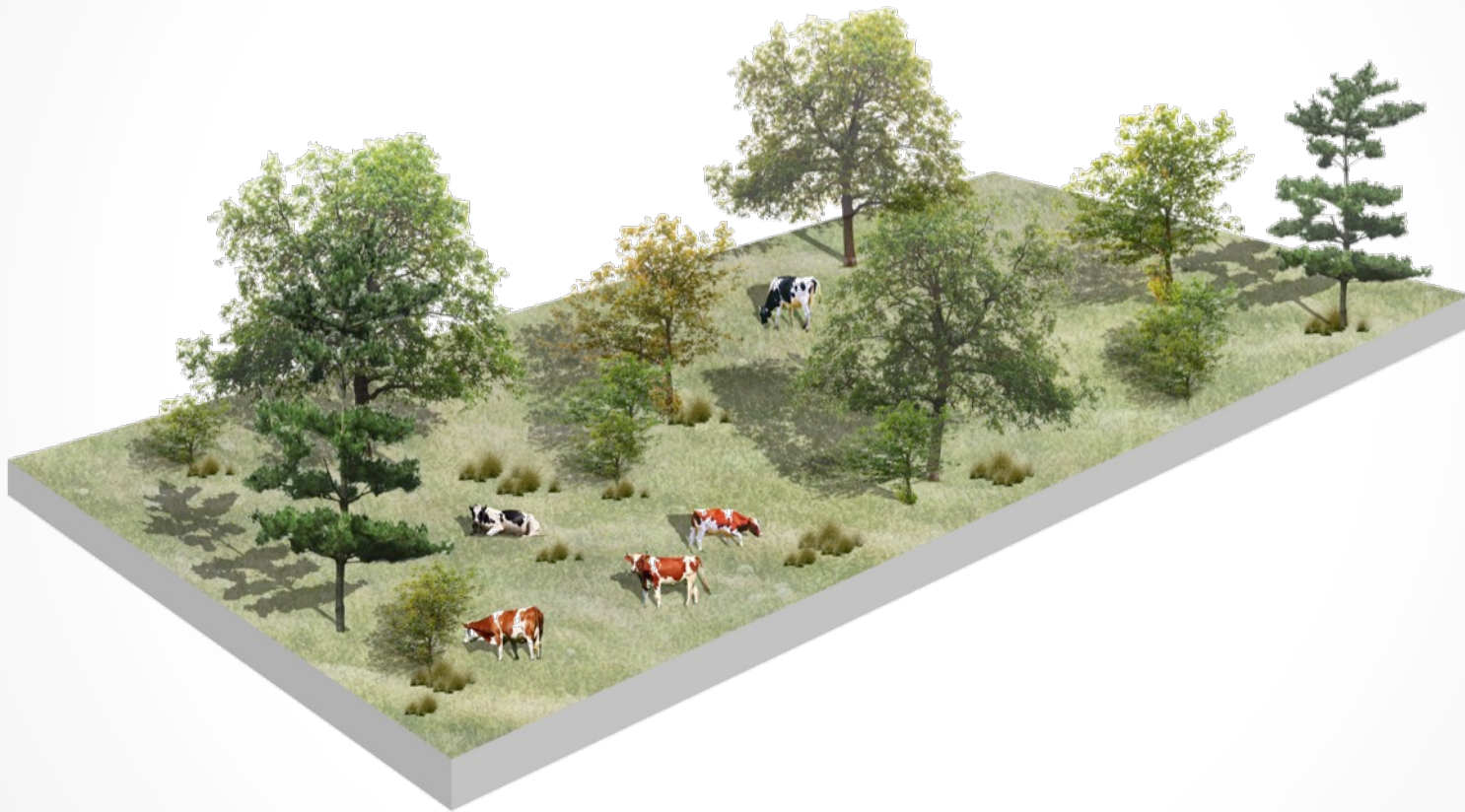
- Green Deal definition:
 - Mimicking a layered natural **forest ecosystem**
 - Canopy layer of **large trees**
 - **> 0.5 ha**



Prerequisites



Prerequisites



Prerequisites



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Prerequisites

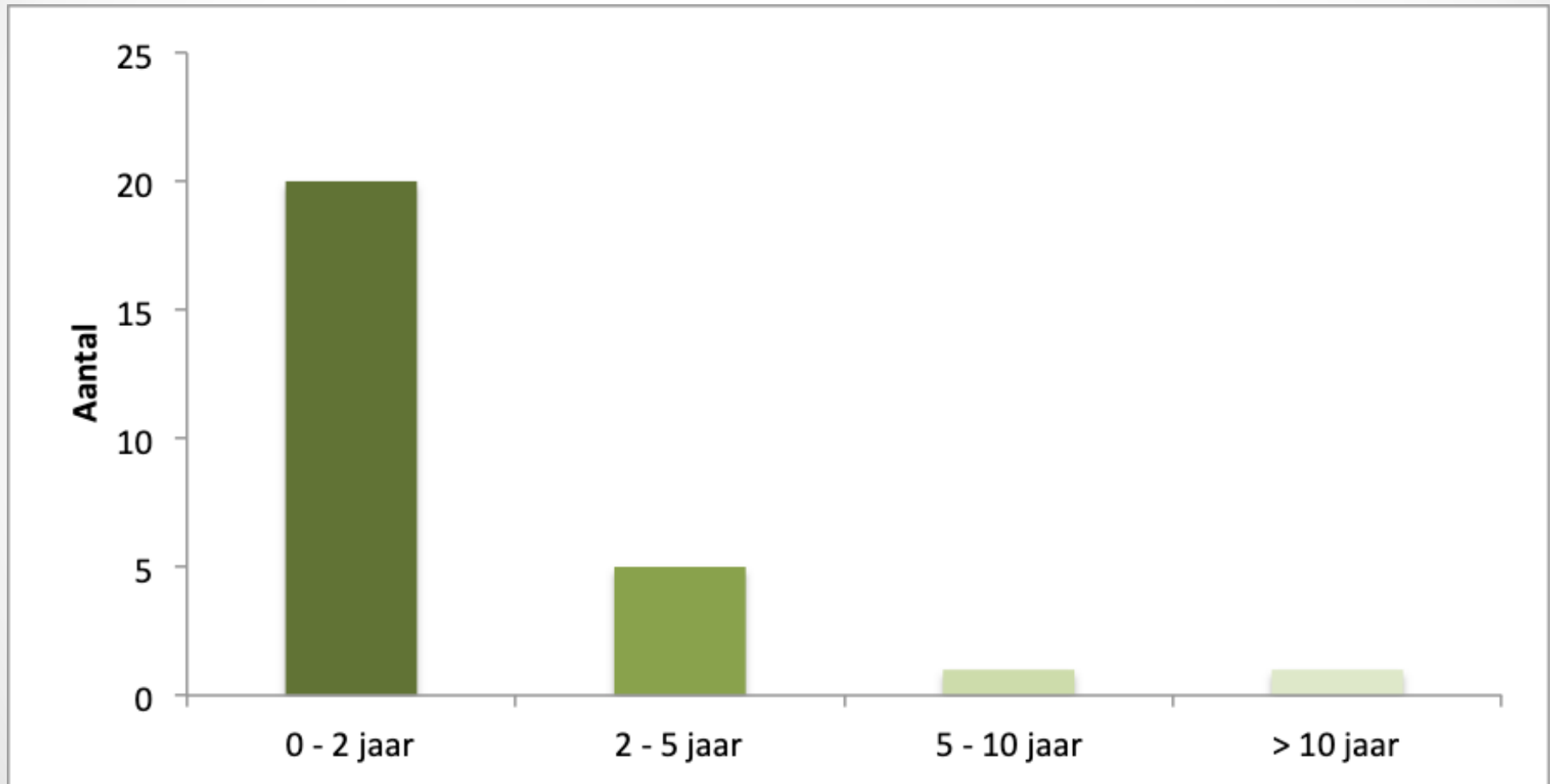
- Capacity & dedication:
 - Willing to **document labour, yield and income** in our online data platform
 - Participate in **field research 0.5 – 1 d / year**
 - **Facilitate researchers** & students
(and participate when you can and want to!)
 - For a minimum of **5 years!**

Status quo

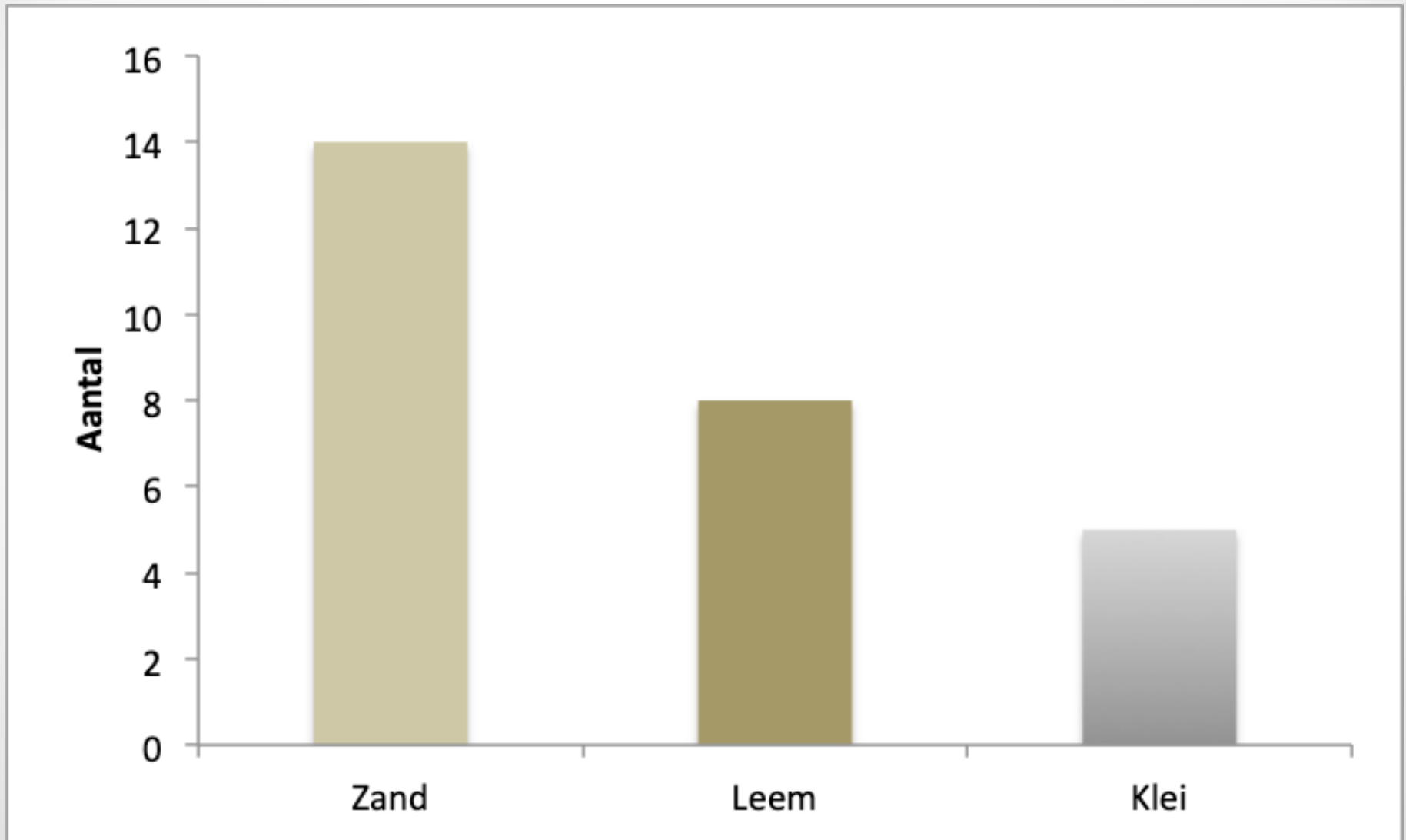


- 27 sites
- >92 hectares!

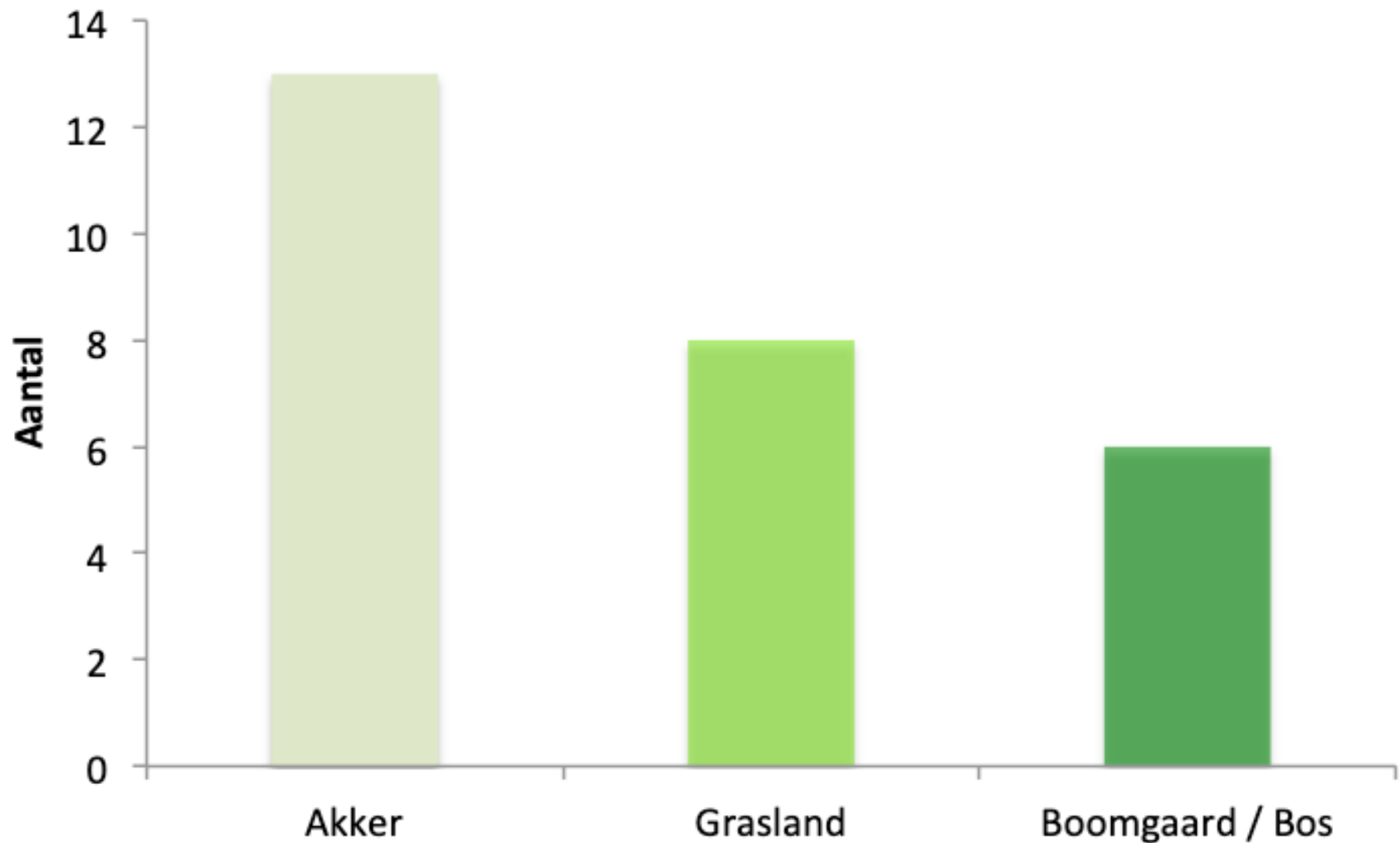
Age



Soil texture



Prior land-use



Soil - indicators

	number	examples
Physical	11	Water infiltration, compaction, %SOM, %clay, silt, sand, etc
Chemical	42	pH, macro- (NPK, S, Fe, etc.) & micronutrients (Na, Ca, K, Mg, Cu, etc.), trace elements (Co, Mo, Se, etc.), CEC, etc.
Biological	47	Earthworms, nematodes, fungi & bacteria



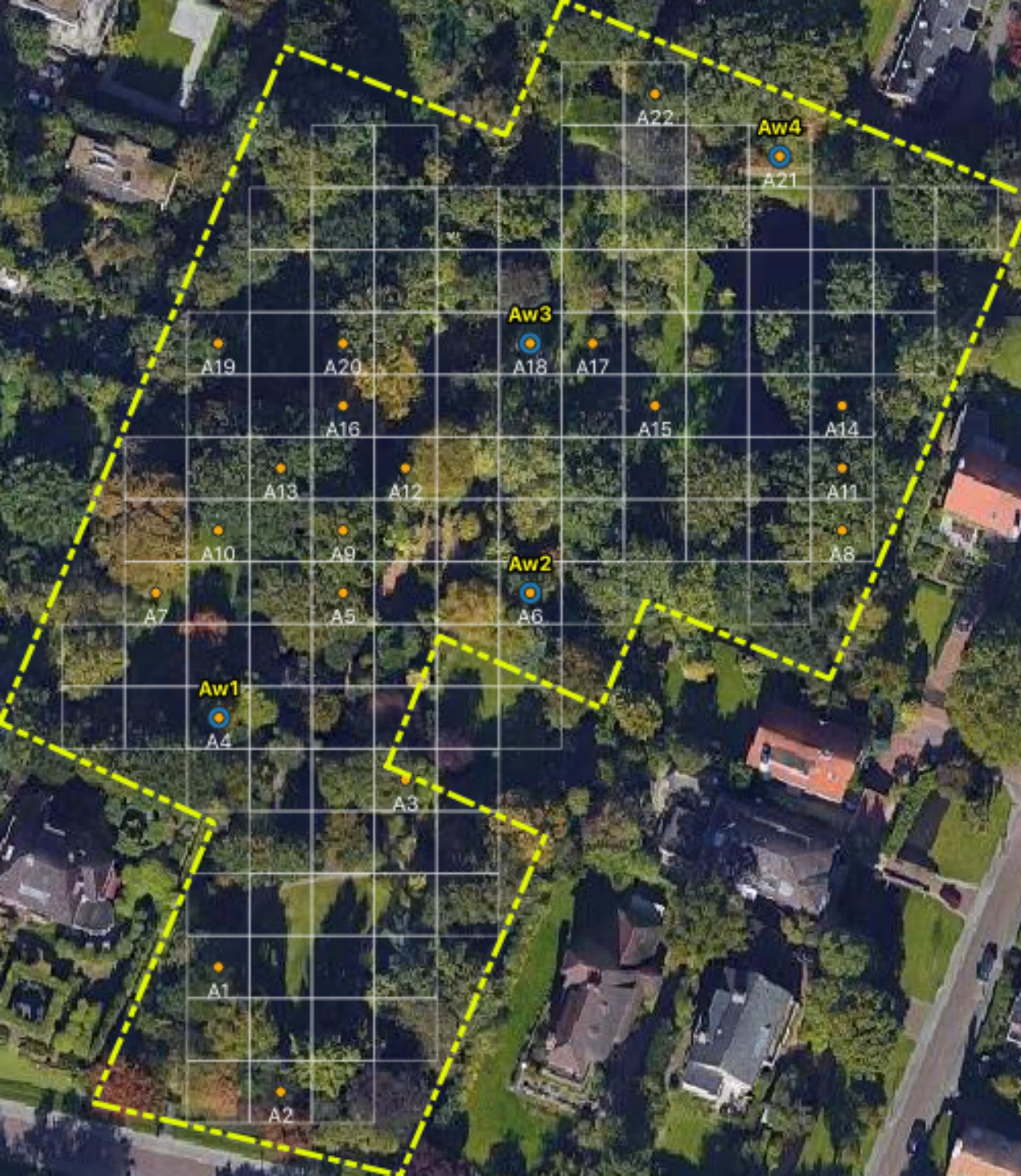
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Food Forest De Overtuin

Site: Rotterdam

Size: 1.5ha

Start: Nov 2018





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Schijndel Hardenkamp

Site: Schijndel

Size: 16ha

Start: Jan 2019



Soil - monitoring



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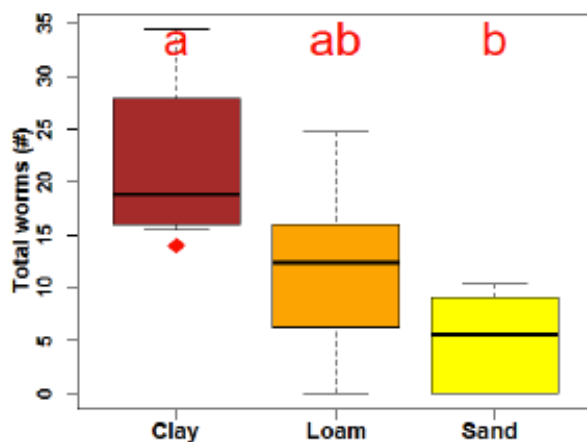
Soil - monitoring



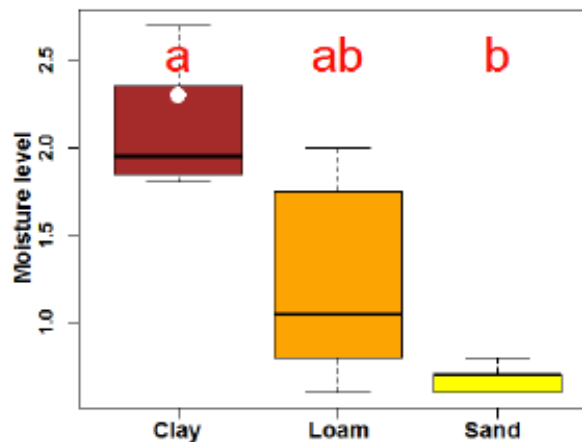
Soil - results (2020)

	N-total*	CEC*	OM*	Moisture**	TB*	MI	Worms
Loam vs. clay	0.3252	0.0025	0.7964	0.073	0.9645	0.9652	0.0665
Sand vs. clay	0.0325	<0.0005	0.1083	0.038	0.9993	0.9959	0.0042
Sand vs. loam	0.2417	0.0004	0.1861	0.054	0.9667	0.9813	0.3332

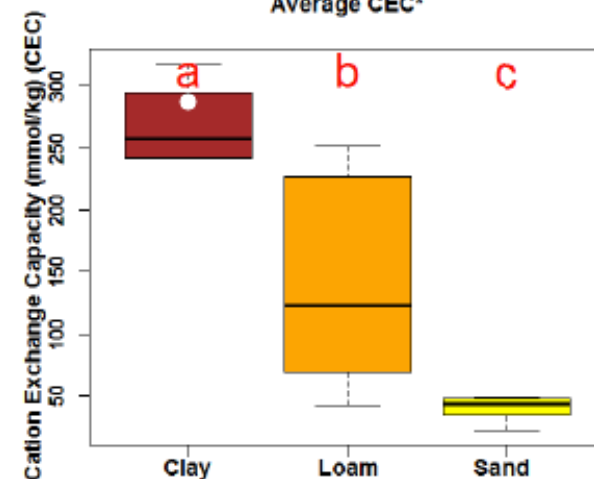
Average total number of earthworms



Average moisture*



Average CEC*



Carbon - indicators

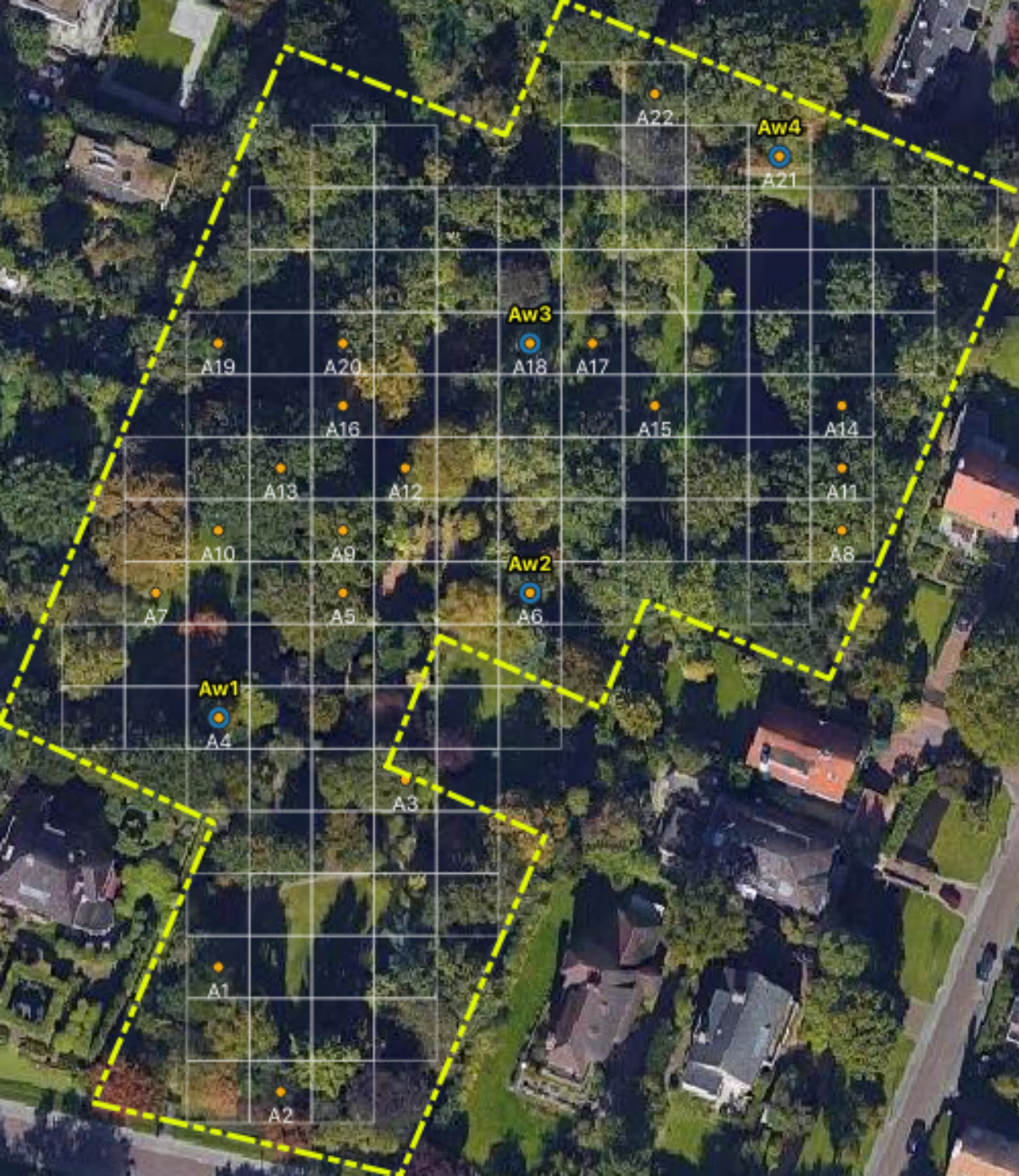


- **Above-ground:**
 - Diameter + height in 10x10m **permanent plots**
 - Specific wood density
- **Below-ground:**
 - Root mass (allometric formulae)
 - Litter
 - Soil organic matter



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Voedselbossen



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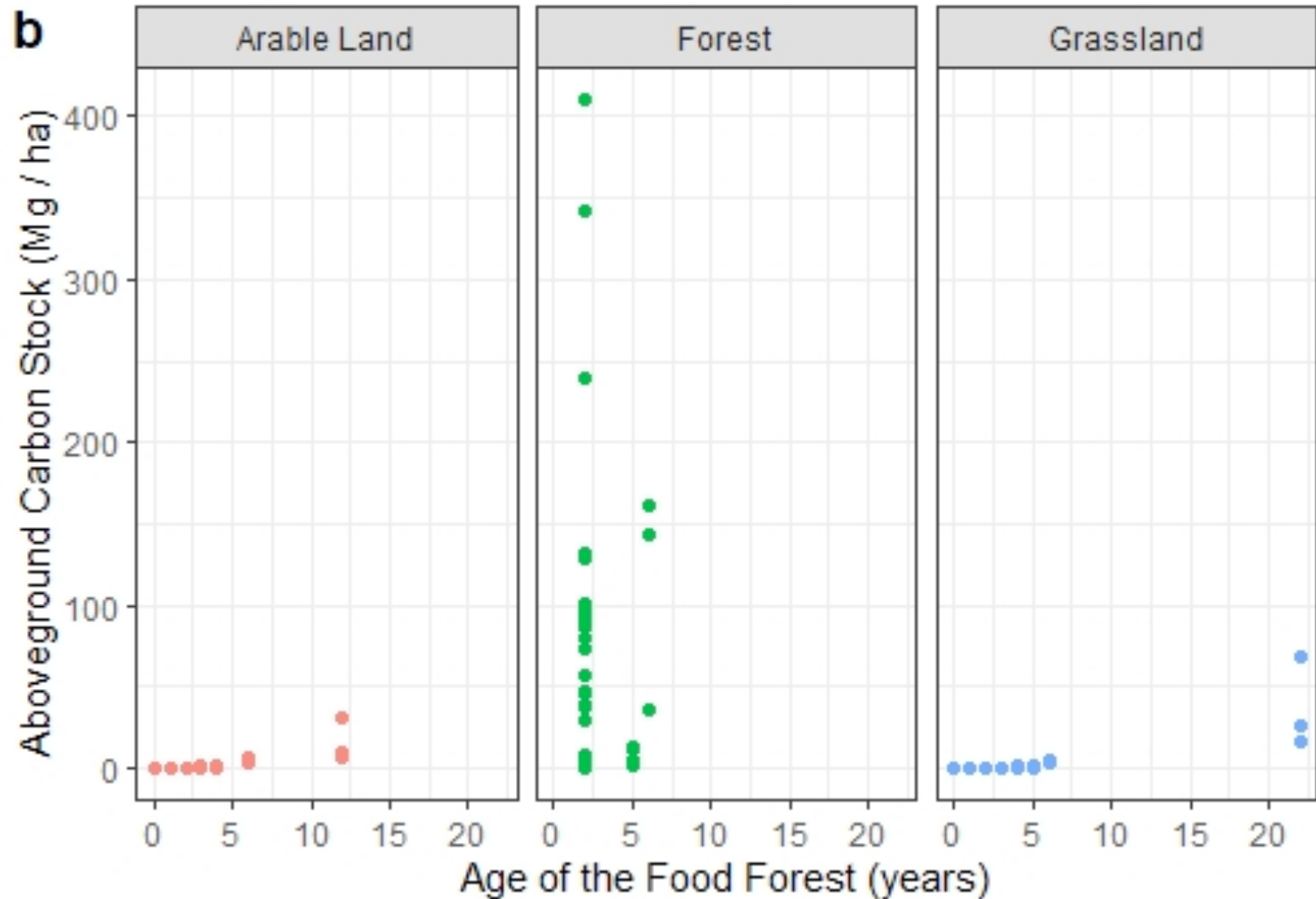
Carbon - monitoring



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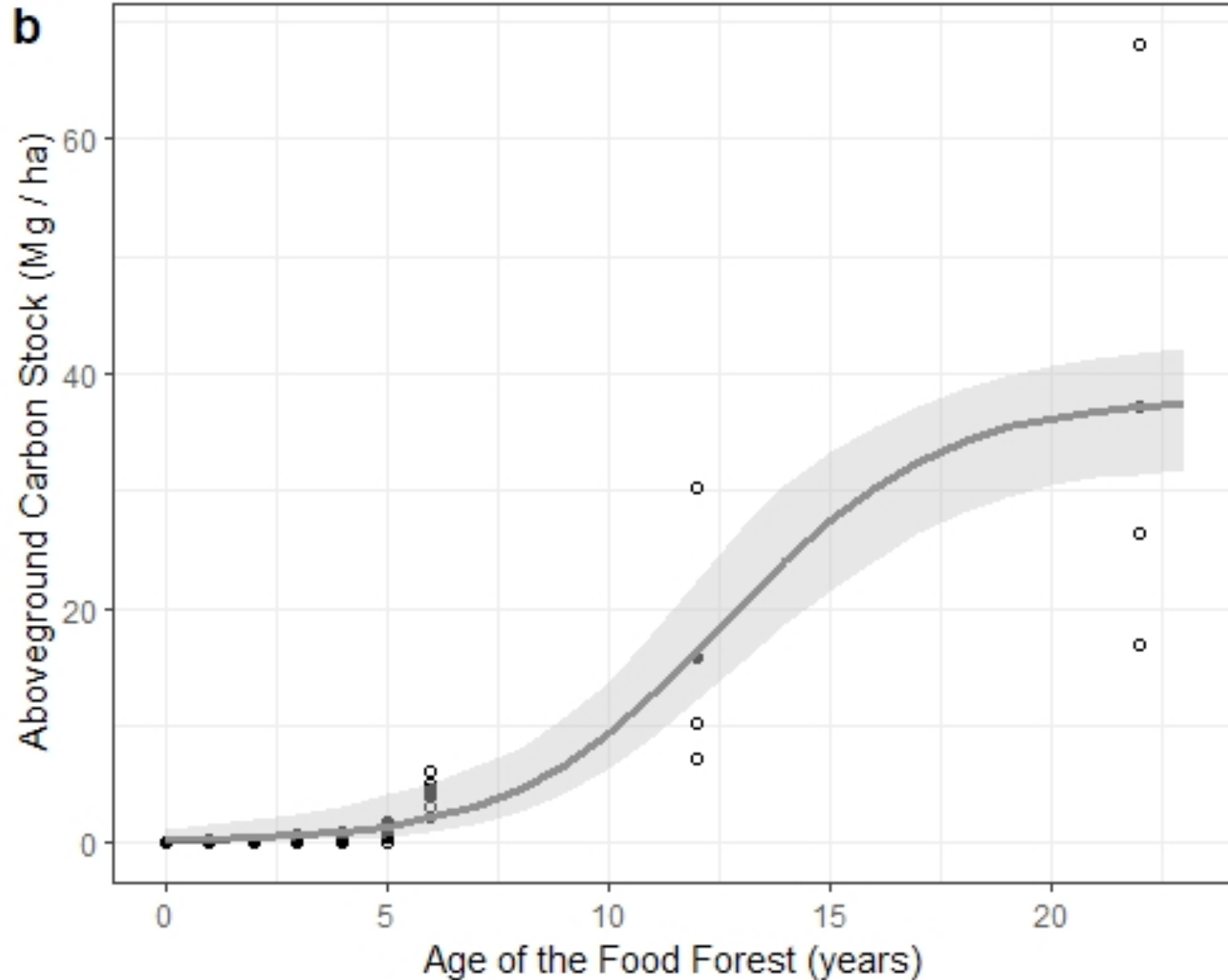
Carbon - results



Carbon - results

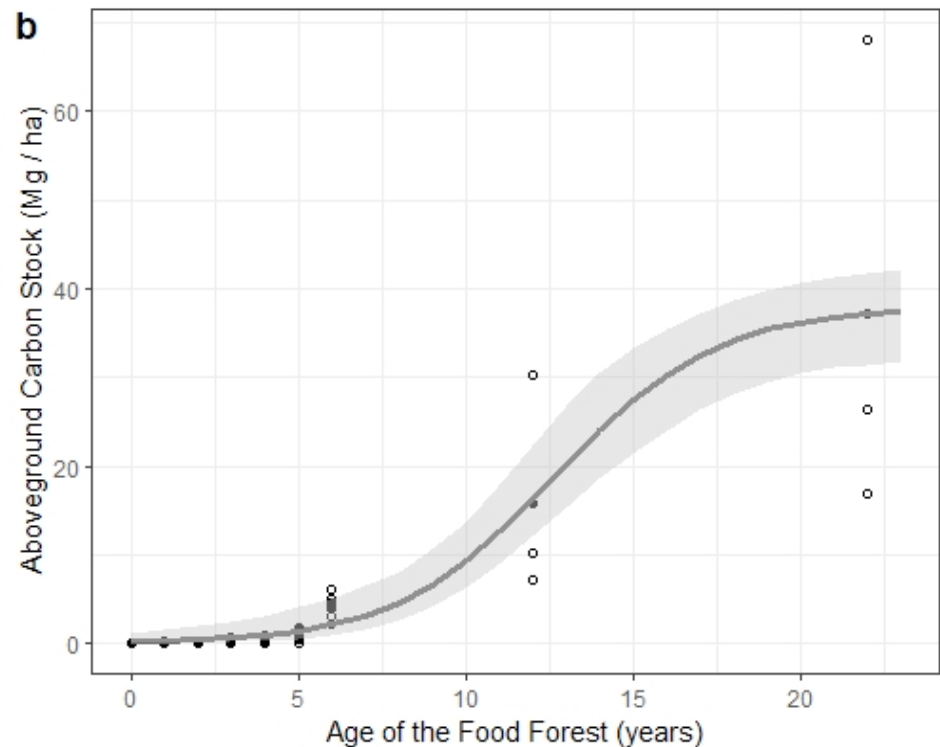


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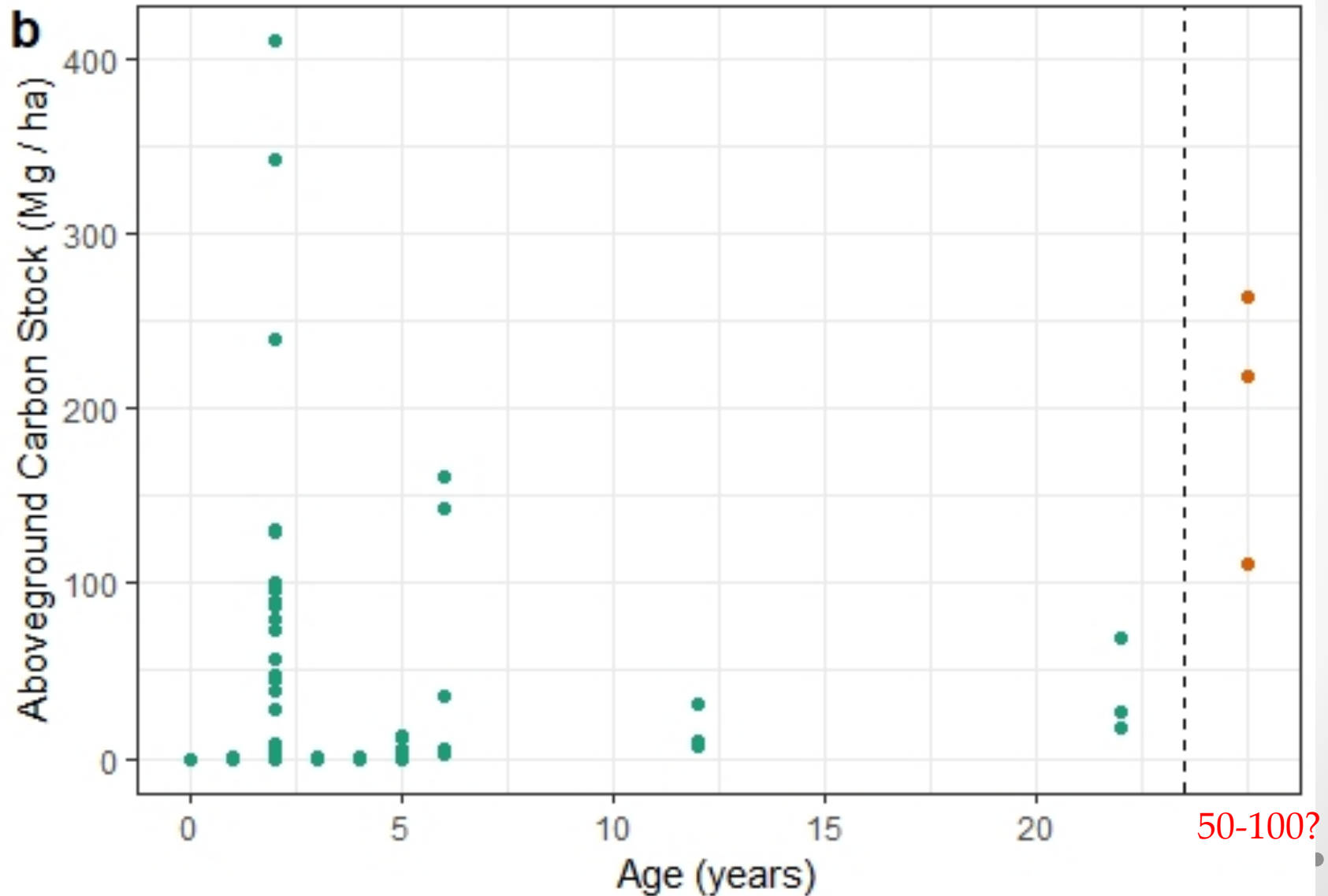


Carbon - results

- **40 ton C/ha in 20y**
- Roughly the same as Martin's forest!
(Lehmann / Schafer et al. 2019)
- **However..**
 - Only Above-ground C
 - Oldest FF:
deviating management
and poor soil



Carbon - results



Vegetation - indicators



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Voedselbossen

- **Composition & biodiversity:**
 - Woody species; count in 10x10m plots
 - Herbaceous; 1x1m plots, Braun-Blanquet
- **Structure**
 - Coverage per layer
 - Canopy closure
- **Zoning**
based on design & ecological context



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Voedselbossen

Food Forest De Overtuin

Site: Rotterdam

Size: 1.5ha

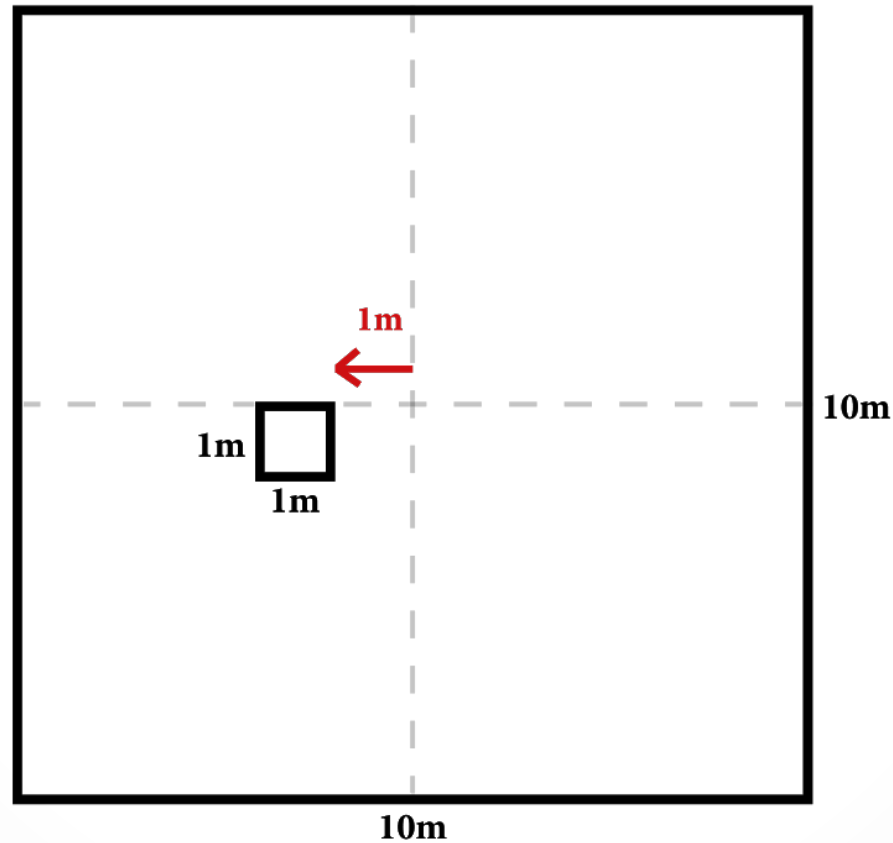
Start: Nov 2018



Vegetation - monitoring



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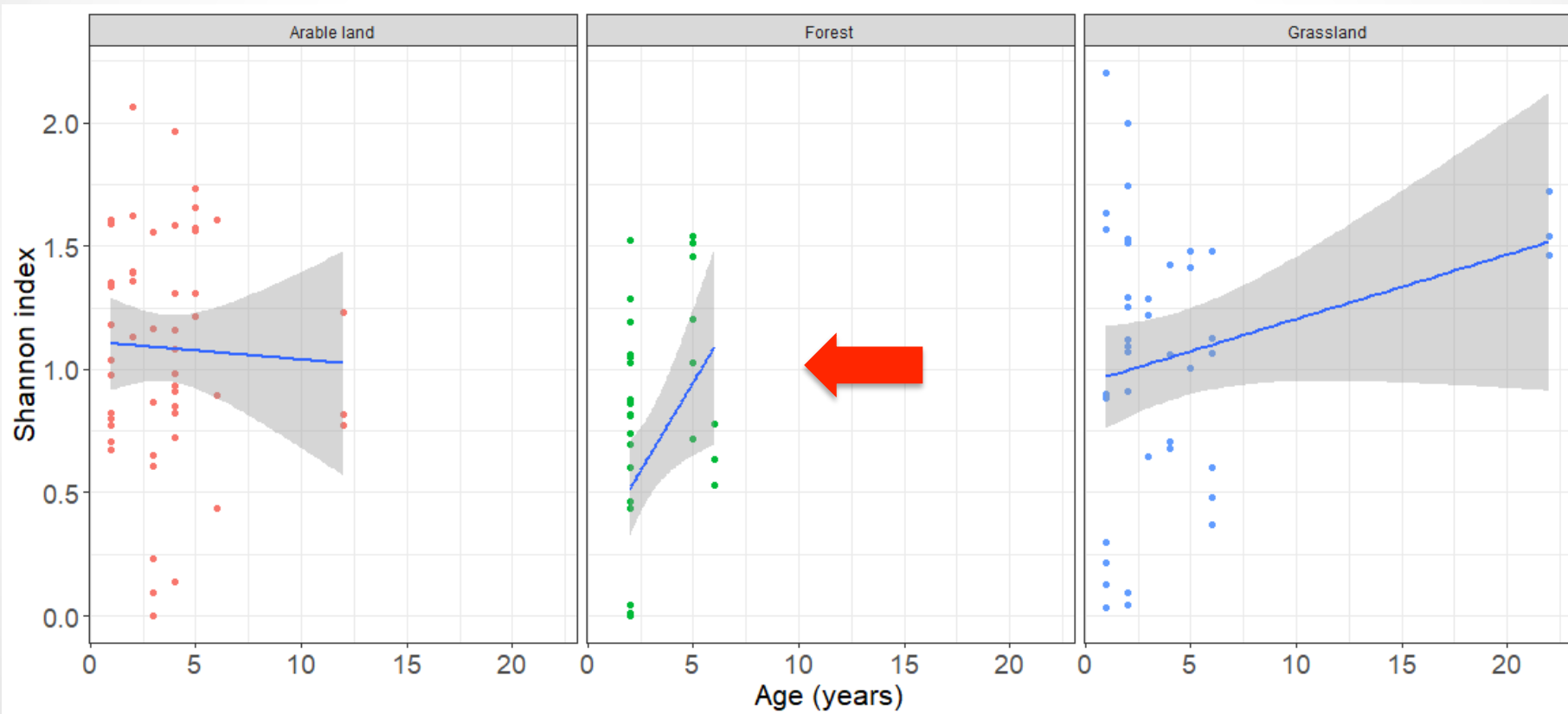
Vegetation - monitoring



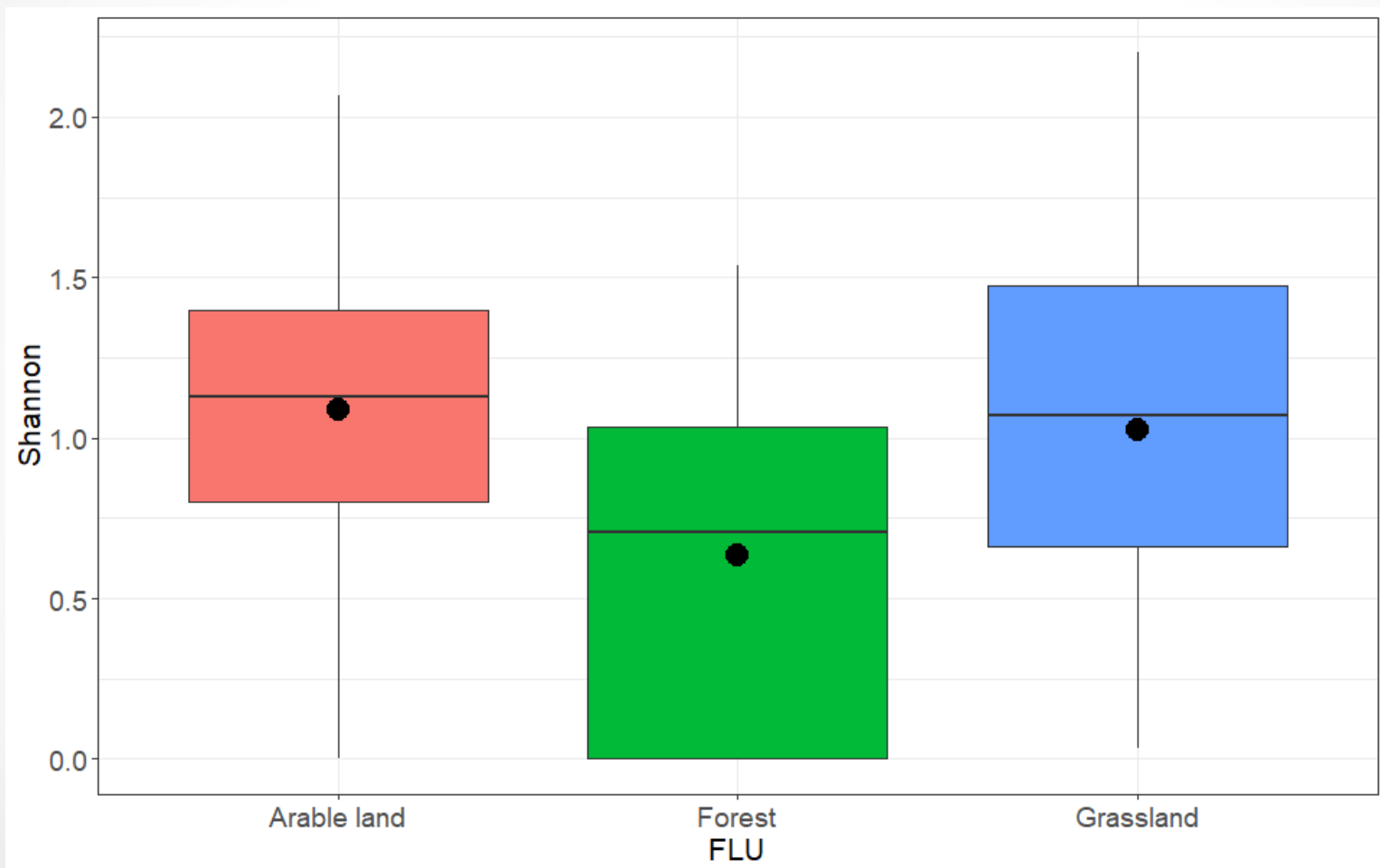
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Voedselbossen



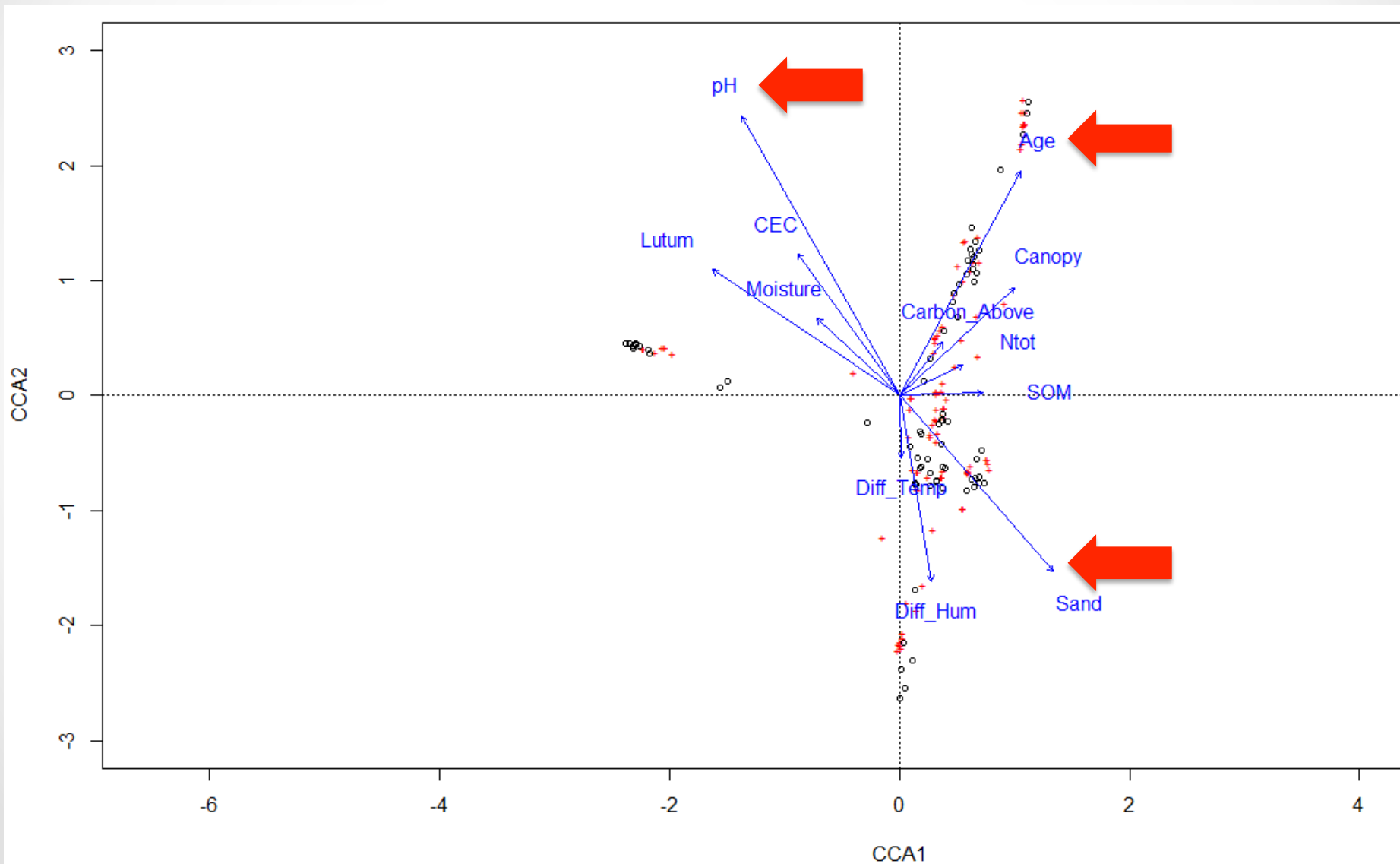
Vegetation - results



Vegetation - results



Vegetation - results



Vegetation - results

- **168 woody species** in 21 food forests
(132 10x10m plots → ~ 1.3 hectare!)
- 22 species avg. per FF
- And **181 herbaceous** species
(132 1x1m plots)
- 17 species avg. per FF

Insects - indicators



- **Butterflies**
 - fixed transect route in sections
(conform national protocols)
- **Terrestrial insects**
 - Carabids, spiders, springtails, etc.,
 - Pitfall traps on same 10x10m permanent plots



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Voedselbossen

Food Forest De Overtuin

Site: Rotterdam

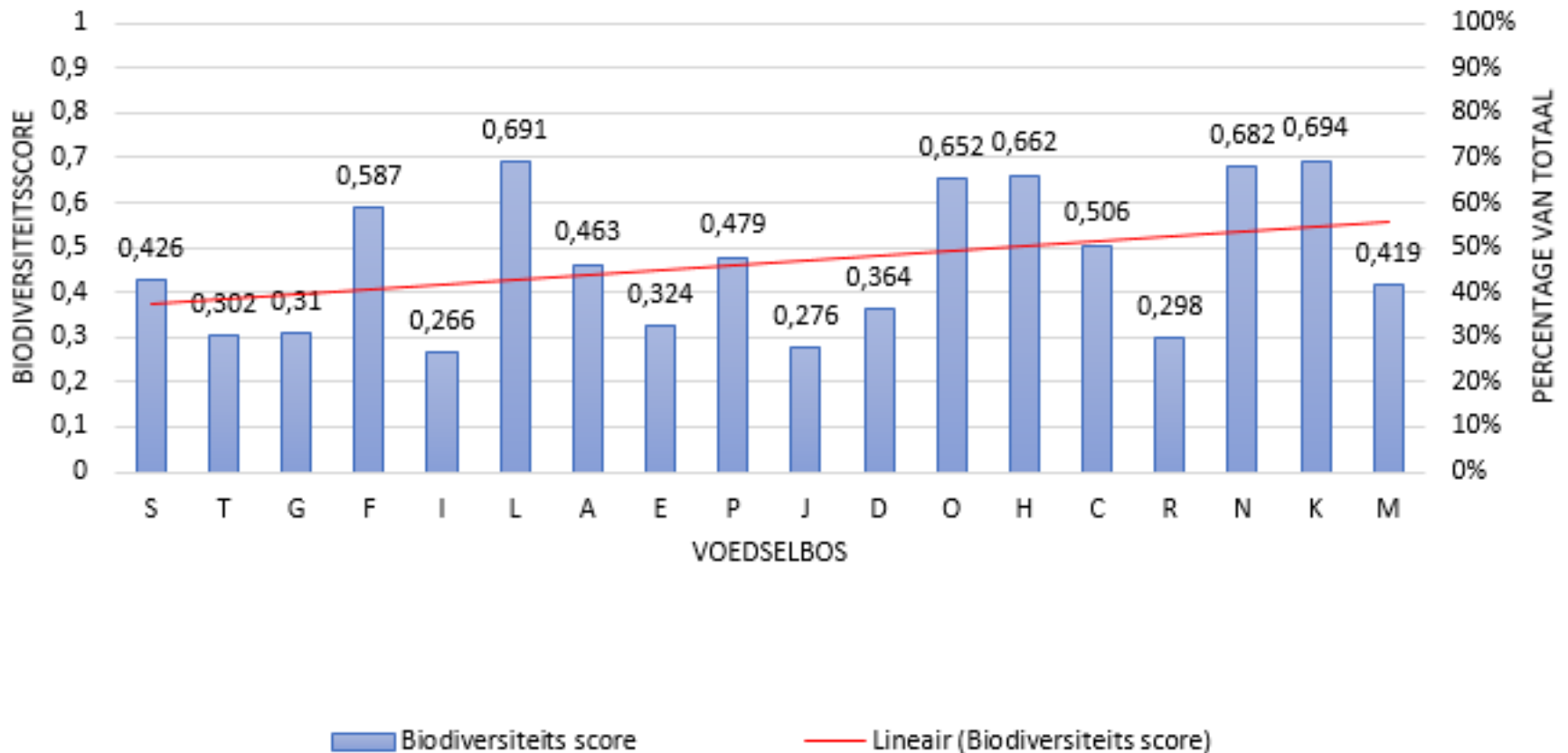
Size: 1.5ha

Start: Nov 2018



Insects - prelim. results

Biodiversiteits score



Insects - prelim. results



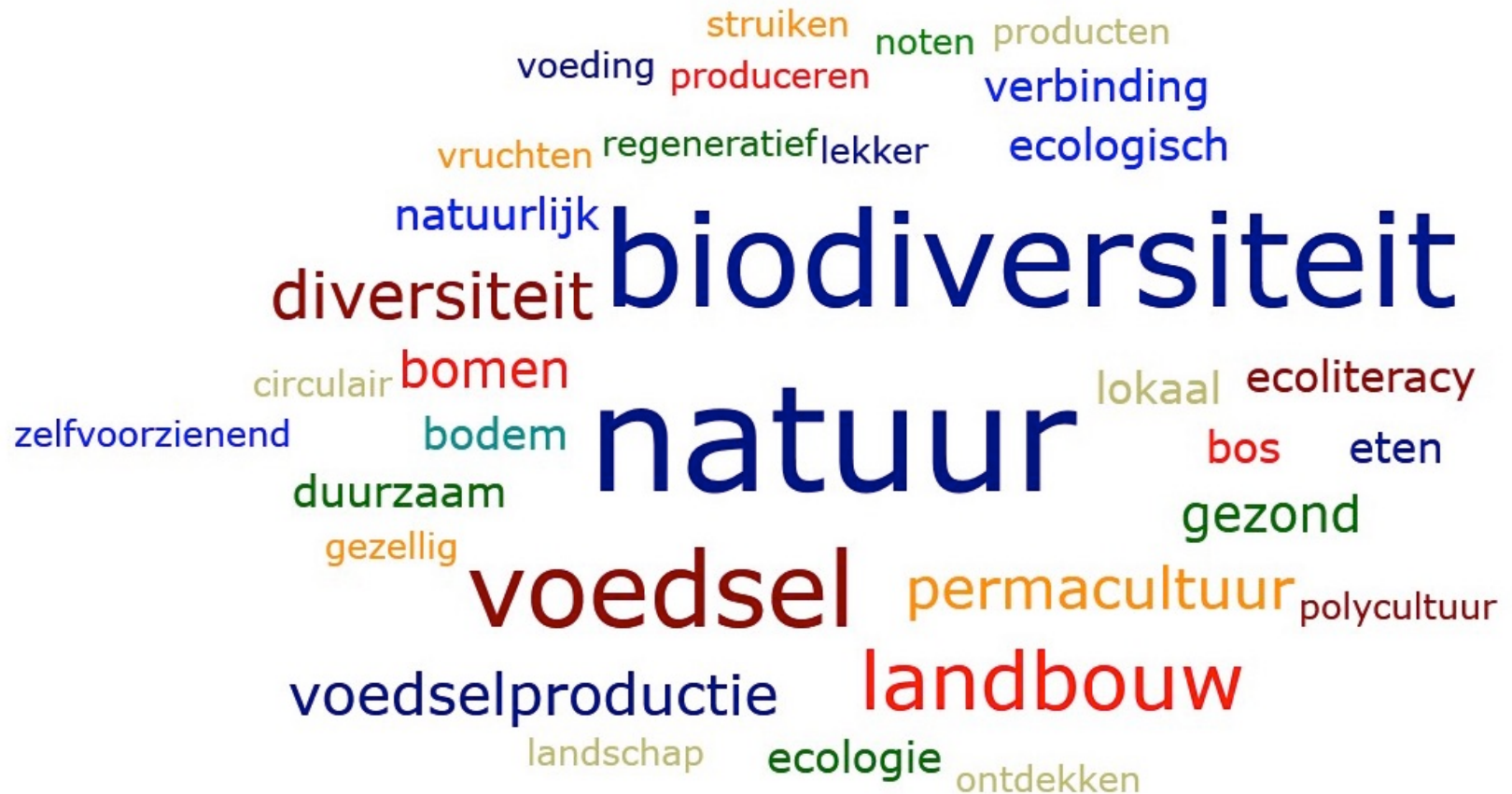
- Several days per FF is not (nearly) enough
- QuickScan for all FF in same season very difficult..
- More results upcoming though!

Social research

Questionnaire:

- Values & motivations
- Social capital
- 50 respondents!

Social - results

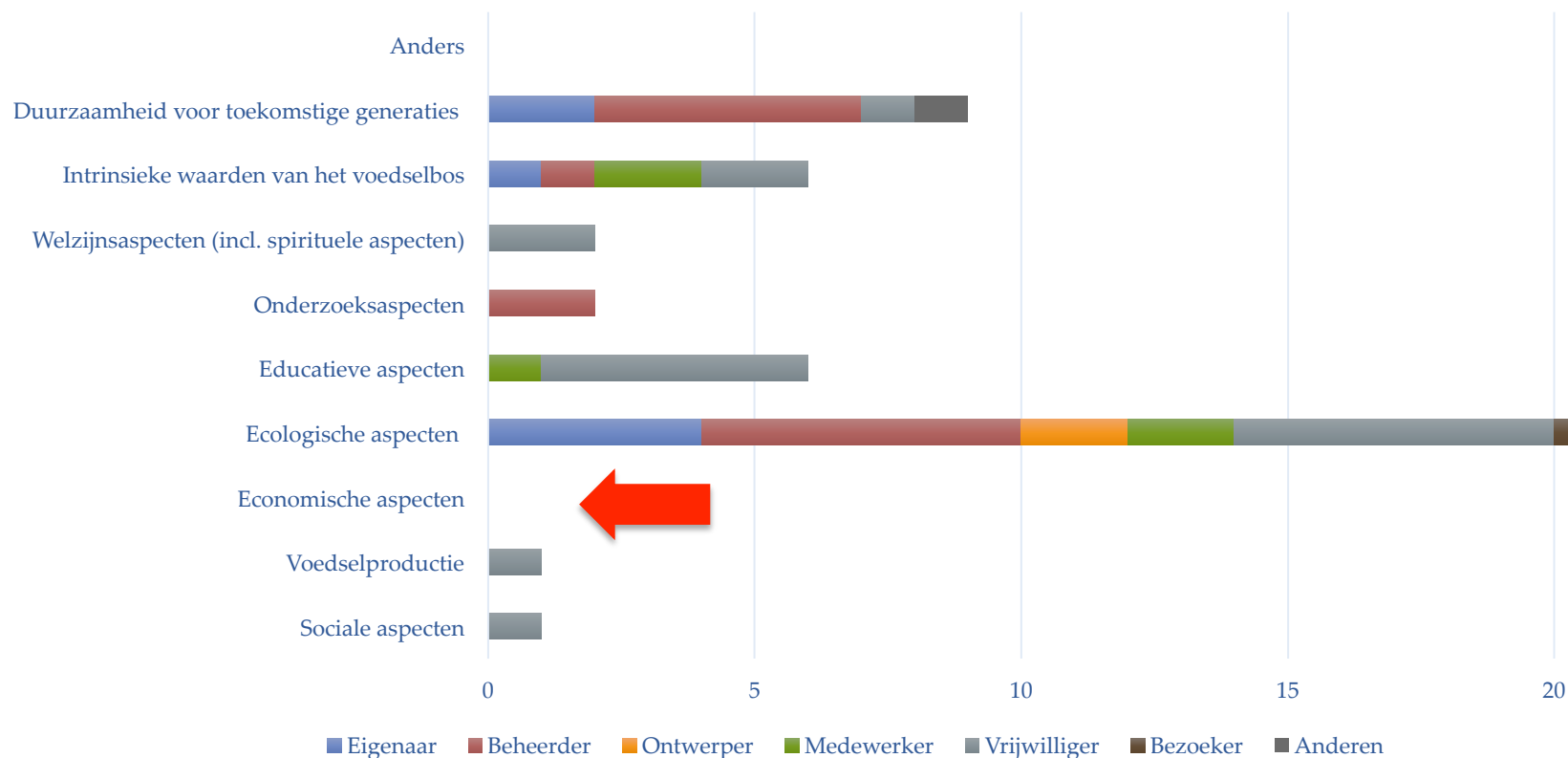


A word cloud of Dutch terms related to food forests and social outcomes. The words are arranged in a circular pattern around the center. The largest words are 'biodiversiteit' and 'natuur'. Other prominent words include 'voedsel', 'landbouw', 'diversiteit', 'bomen', 'bodem', 'duurzaam', 'gezellig', 'voedselproductie', 'landbouw', 'ecologie', 'ontdekken', 'landschap', 'voeding', 'produceren', 'struiken', 'noten', 'producten', 'verbinding', 'ecologisch', 'vruchten', 'regeneratief', 'lekker', 'natuurlijk', 'circulair', 'zelfvoorzienend', 'lokaal', 'ecoliteracy', 'bos', 'eten', 'gezond', 'permacultuur', and 'polycultuur'.

struiken noten producten
voeding produceren verbinding
vruchten regeneratief lekker ecologisch
natuurlijk
diversiteit **biodiversiteit**
circulair **bomen** lokaal ecoliteracy
zelfvoorzienend bodem **natuur** bos eten
duurzaam gezond
gezellig **voedsel** permacultuur polycultuur
voedselproductie **landbouw**
landschap ecologie ontdekken

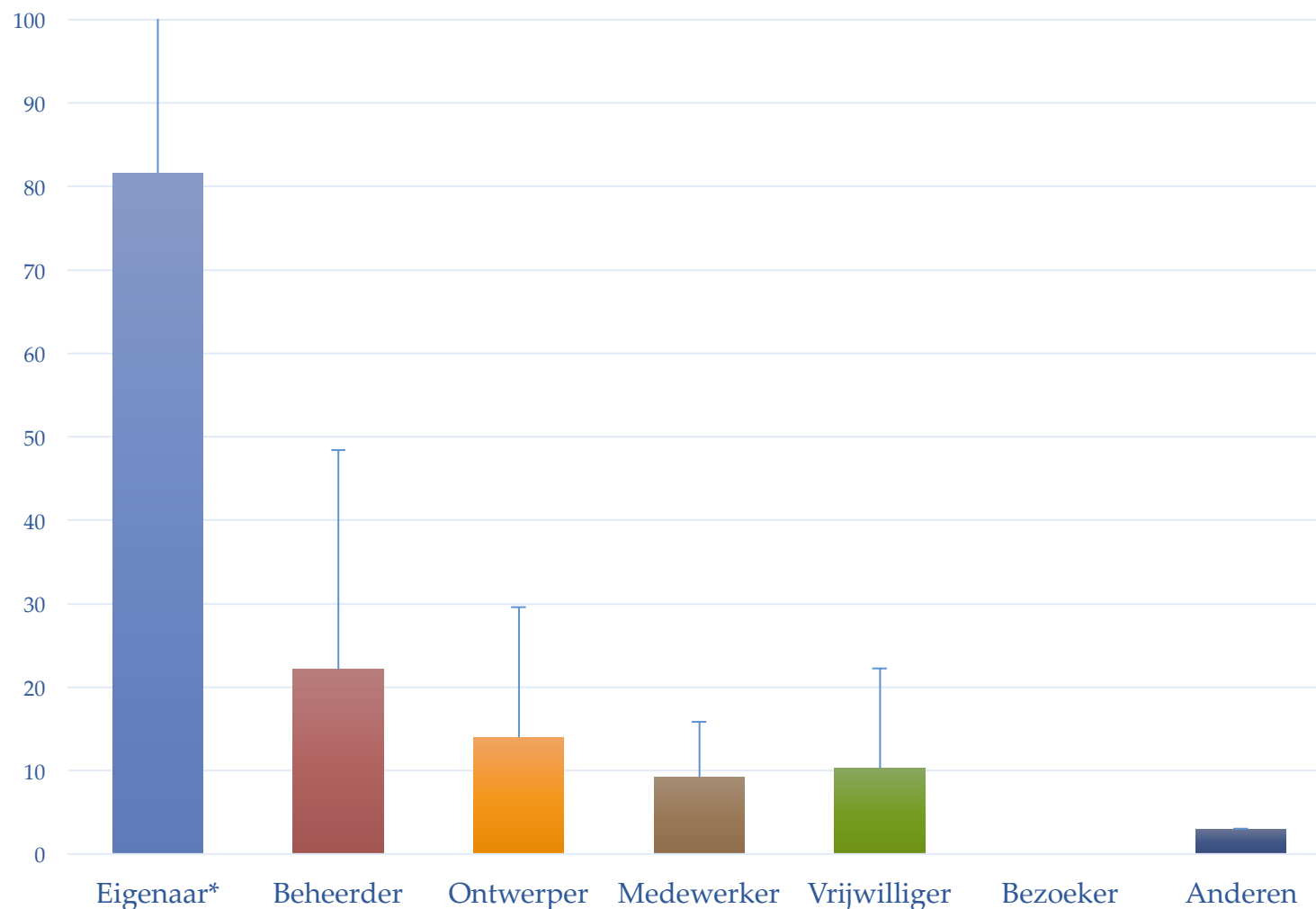
Social - results

Belangrijkste Aspect per Belanghebbende



Social - results

Gemiddeld Aantal Sociale Contacten per Belanghebbende



Economic research

← Monitoring v 12.0

OOGSTVERKOOPONDERHOUD

Repetición: 1

1. Heb je een product geoogst?
☒ Ja
☐ Nee

2. Op welke datum is er geoogst?*

10 sept. 2020

SELECCIONE FECHA

3. Van welke laag en soort is de oogst?*

Laag

Kruinlaag

Soort

Engelse walnoot

← Monitoring v 12.0

OOGSTVERKOOPONDERHOUD

Repetición: 1

Onderhoud - 1

1. Heb je onderhoud gepleegd?
☒ Ja
☐ Nee

2. Op welke datum heb je onderhoud gepleegd?*

SELECCIONE FECHA

3. Wat voor onderhoud heb je gedaan?*

☐ Aanplanten

☐ Snoeien van aanplant

☐ Ongewenste vegetatie verwijderen (wieden, uitsteken, wildopslag, etc.)

☐ Paden vrij maken

← Monitoring v 12.0

ONDERHOUDAANPLANT / UITVALNEVENACTIVITEITEN

Repetición: 1

1. Heb je een nevenactiviteit georganiseerd?
☒ Ja
☐ Nee

2. Op welke datum heb je een nevenactiviteit georganiseerd?*

2 sept. 2020

SELECCIONE FECHA

3. Wat voor een nevenactiviteit heb je georganiseerd?*

☐ Rondleiding

☐ Workshop of cursus

☐ Evenement (bruiloft, festival, open dag)

☐ Otros...

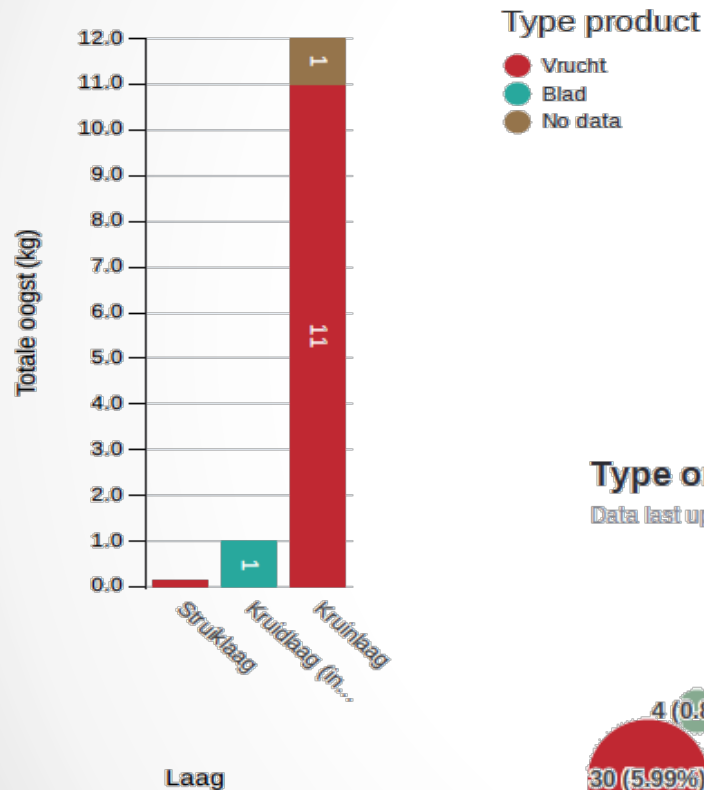
Economic research



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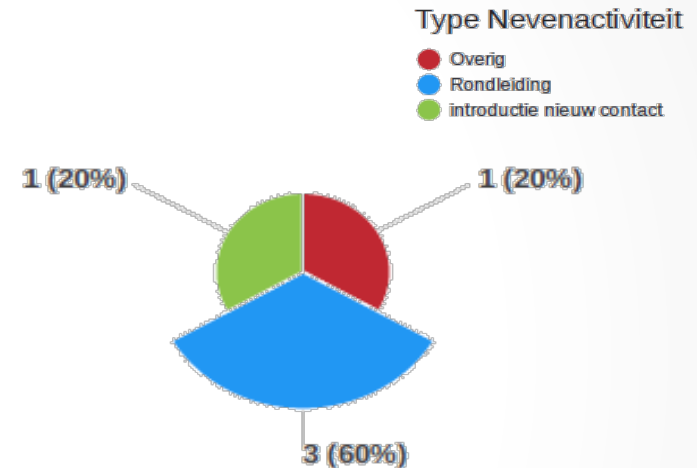
Totale oogst per laag

Data last updated: 17th Aug 2020 - 14:28



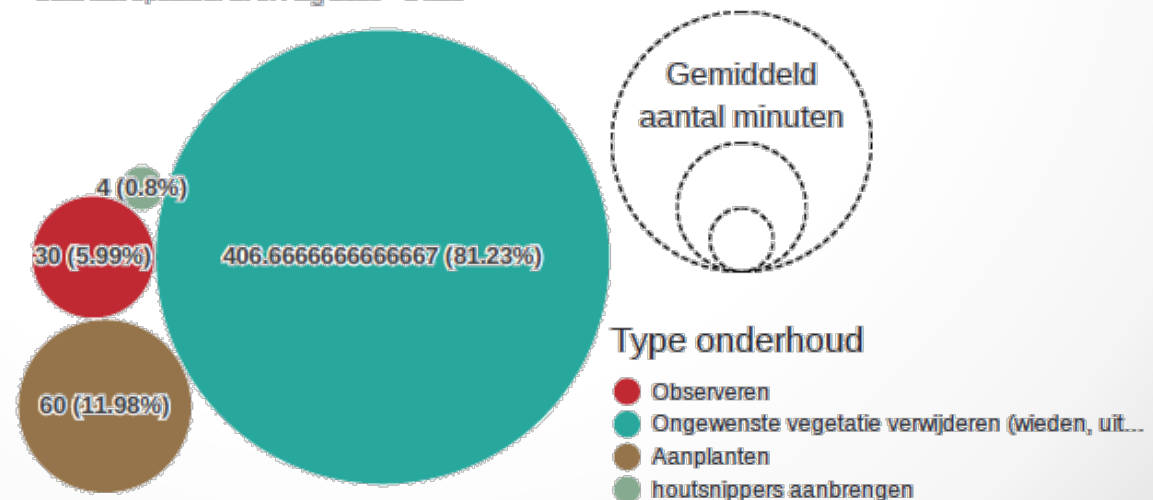
Type Nevenactiviteit

Data last updated: 17th Aug 2020 - 14:28



Type onderhoud

Data last updated: 17th Aug 2020 - 14:28



Thank you!

