



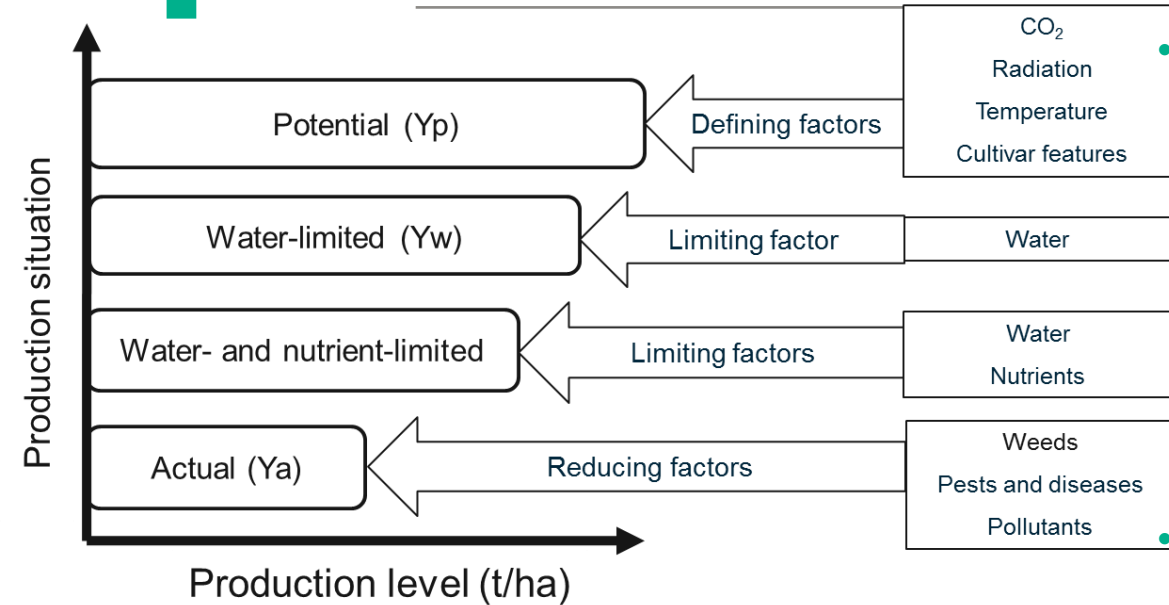
LegumeGap

**Increasing productivity and sustainability of
European plant protein production by closing
the grain legume yield gap
April 2019 – September 2022**

Fred Stoddard, University of Helsinki



Objectives



From www.yieldgap.org

What are the causes of poor yield and what can we do about them?

- Yield gap analysis
- Mapping of yield potential
- Farmers' knowledge of legume needs is limited, adding to the gap

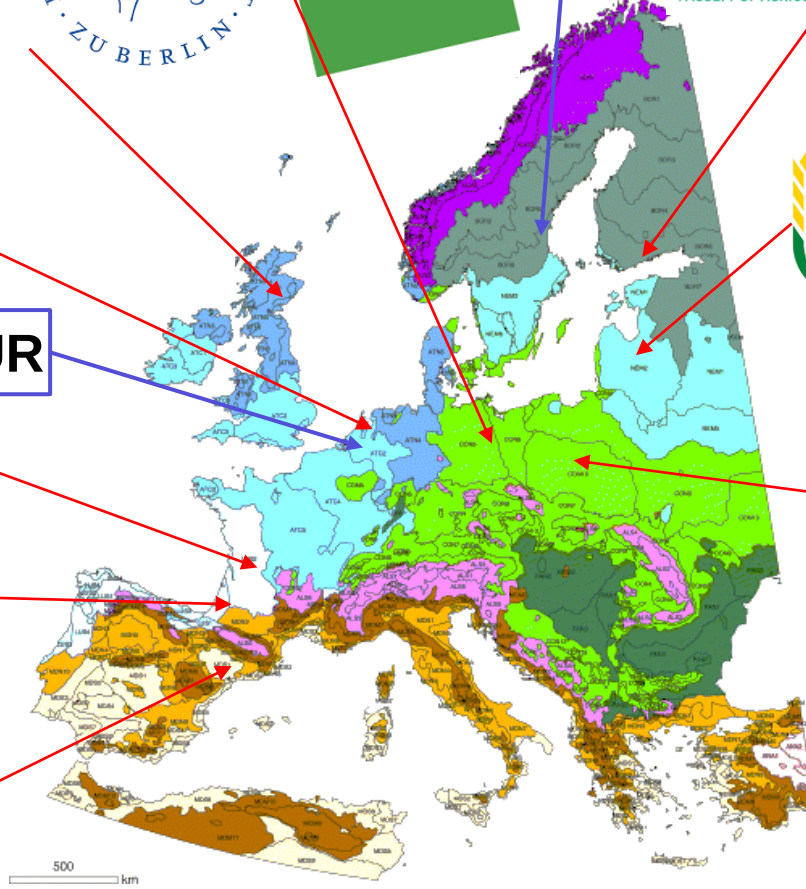
We focus on:

- Soybean for warm-temperate regions, 39% protein
- Faba bean for cool-temperate regions, 29% protein

New partners



HELSINGIN YLIOPISTO
HELSINGFORS UNIV
UNIVERSITY OF HELSINKI
Universitat de Lleida



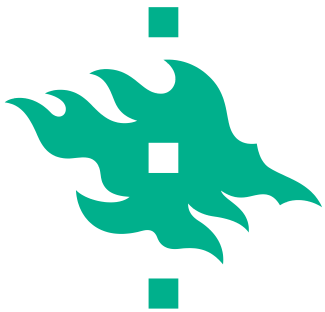
Latvia University
of Life Sciences
and Technologies



Wrocław
University
of Science
and Technology

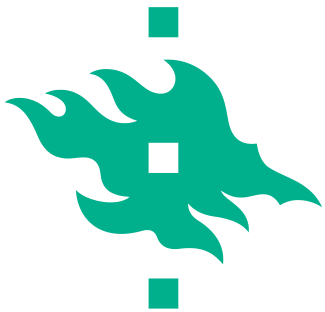
www.helsinki.fi/yliopisto





WP1: Modelling

- STICS tool for potential yield
- Soy well advanced, faba less so
 - Available datasets required conversion
- Models estimate biomass well
 - Yield less so: what factors determine partitioning? Maturity?

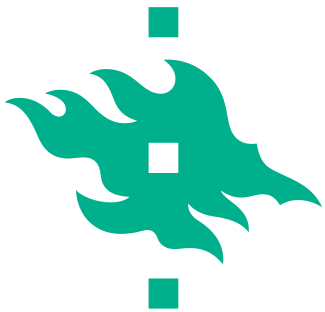


WP2: Cultivar evaluation

Determining achievable (water-limited) yield from national yield trials

Existing data	Faba	Soy
Trials	113	240
Sites	79	101
Years	1972-2020	2009-2019
Countries	5 (46% DE)	4 (79% DE)

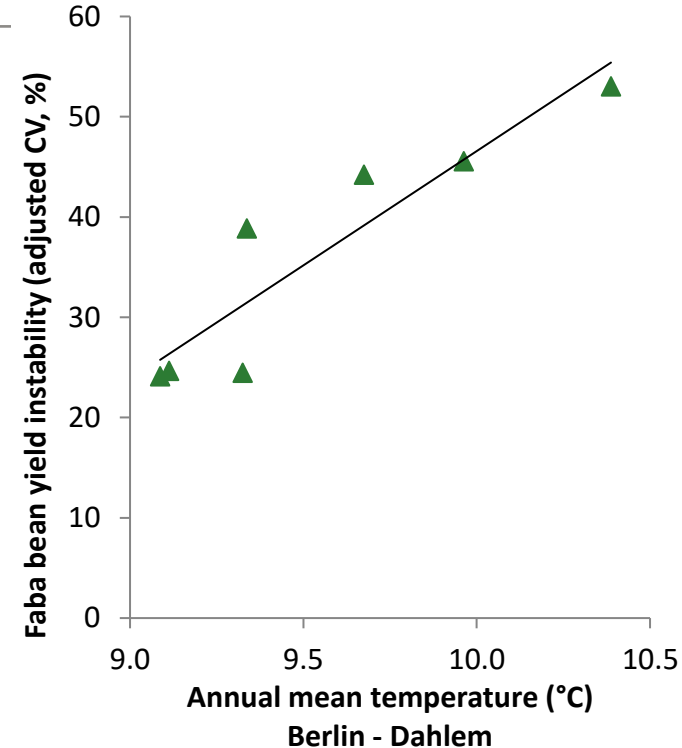
New experiments:
3 sites each PL, DE, ES
9 soy, 3 faba
2019, 2020, 2021
Phenology and yield

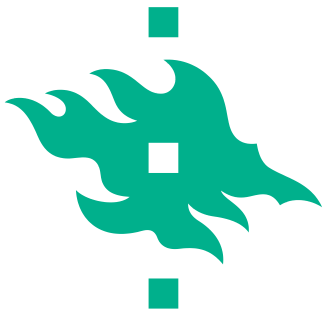


WP3: Management practices

Limiting and reducing factors

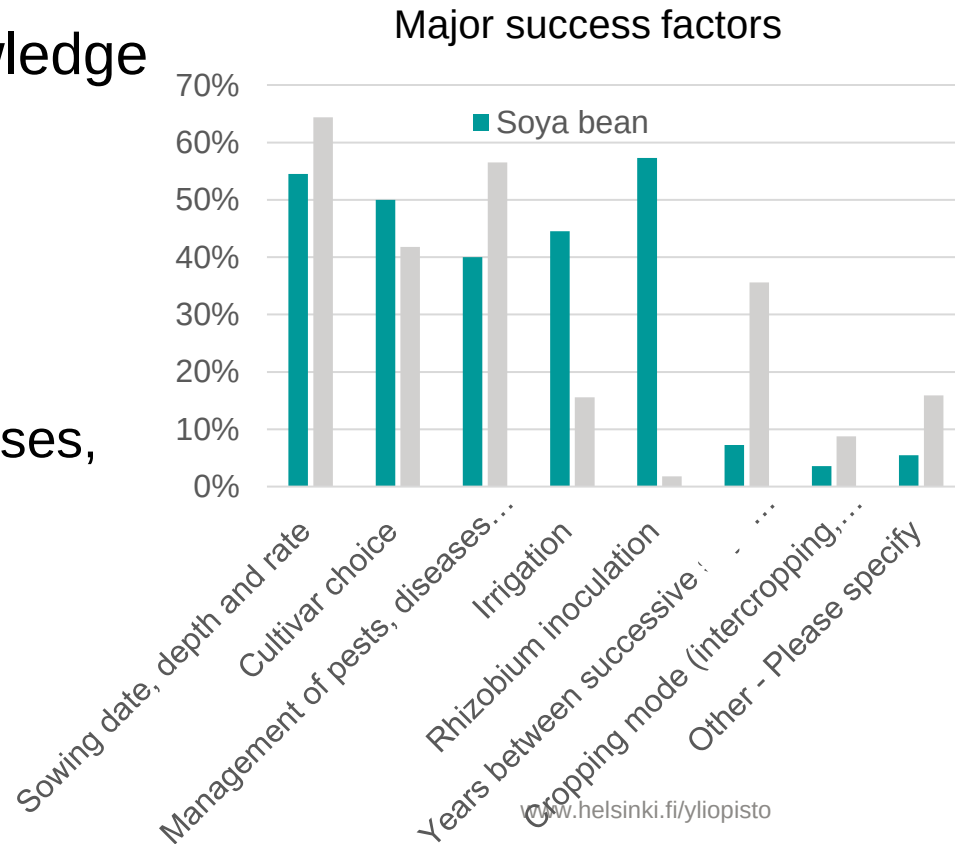
- Literature review and experiments
 - Procedures to reduce yield gaps
- Climate effects on yield instability
 - Data from 7 long-term experiments in 5 countries
 - Abiotic stress resistance needed in future

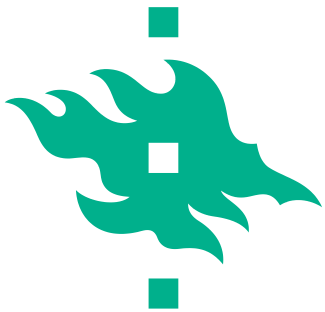




WP4: Analysing the yield gap

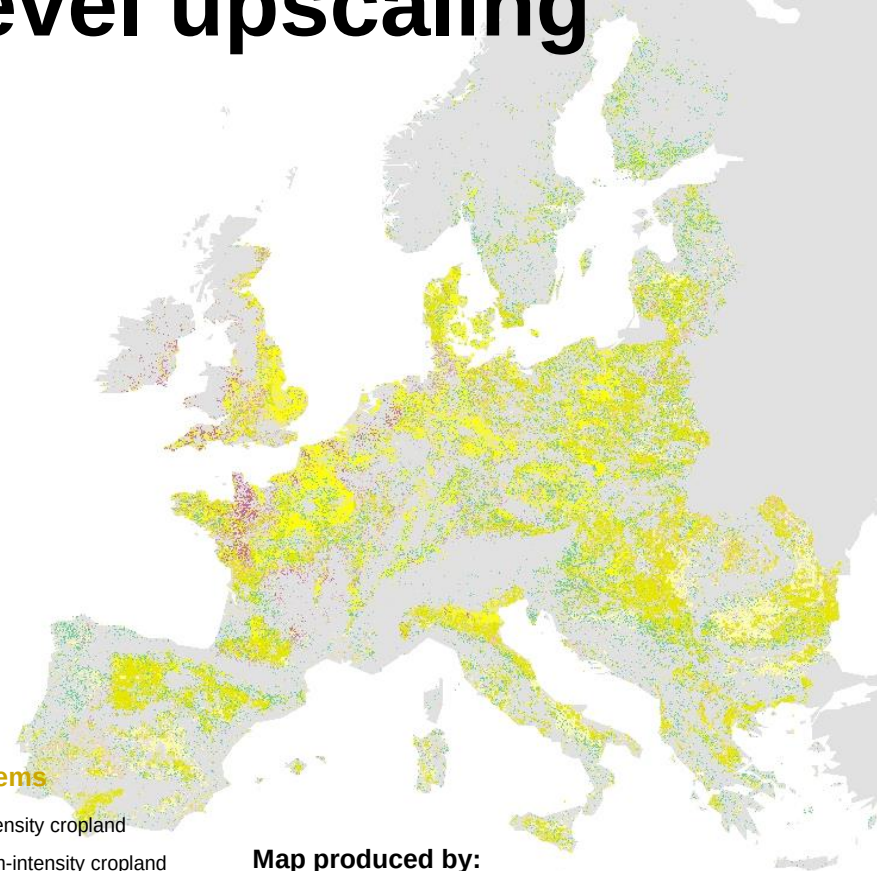
- Assembling knowledge from WP1-3
- Survey of farmer knowledge
 - 9 countries, 833 complete responses, 1027 partial





WP5: EU-level upscaling

Analysis of potential **production** of legumes in Europe : → Arable Land Systems Map



Mosaic systems

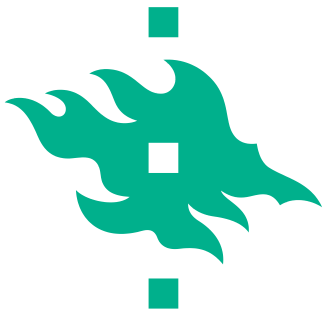
- forest/shrubs and cropland mosaics
- forest/shrubs and mixed agriculture mosaics
- low-intensity agricultural mosaics
- medium-intensity agricultural mosaics
- high-intensity agricultural mosaics

Crop systems

- low-intensity cropland
- medium-intensity cropland
- high-intensity cropland

Map produced by:

Dou, Y., Cosentino, F., Malek, Z.,
Maiorano, L., Thuiler, W. & Verburg, P.H.
(in preparation) Land system science and
landscape ecology: a new European land
systems representation accounting for
landscape characteristics



Conclusion

- Project about management more than breeding
- Highlights importance of resistance to both biotic and abiotic stresses
 - Mapping will show regions with maximum yield potential
- Biomass partitioning a question

Soy meal arrives at Dutch factory



Roots with nodules



Faba beans in Finland

