

INVESTIGATING MIXED CROPPING SYSTEMS WITH PEA AND LENTILS FOR CLIMATE-SMART AND DEMAND ORIENTED AGRICULTURE

Introduction

Due to their nutritional values and their ability to improve soil fertility peas (*Pisum sativum* L.) and lentils (*Lens culinaris* Medik.) are significant contributors to a sustainable transformation of the agricultural system. However, their cultivation in pure stands carries risks of low yield or total yield losses due to lodging, poor weed competition and emerging diseases. With the project PROMISE we want to promote the cultivation of pea and lentil by optimising the two mixed cropping systems: Pea & Barley and Lentil & Pea.

Methods

- Field trials were conducted at two organic certified farms in the Swiss Midlands, 2020 – 2022. At one fertile and one root-rot infested site, with three lentil varieties, up to 16 pea varieties (depending on year and experiment) and one two-row barley variety, three replication in a randomised complete block design.
- Presented measurements: gross margin, root rot infestation index (grades 1-9) and Nmin of soil samples from depth 0-60cm at harvest.
- Statistical analysis of grain yield in monetary gain per area unit followed by ANOVA.

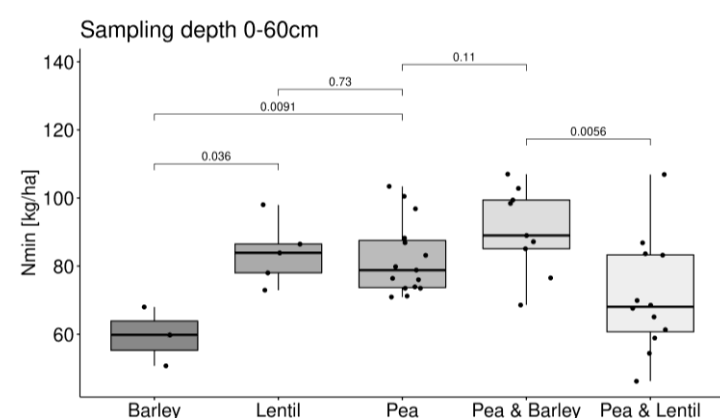


Fig. 2 Nmin measurements of pure and mixed cropping at the fertile site at harvest in 2022.

Results

Pea genotype, year, location and cropping system influence the gross margin. The variance in farmers' gross margin was significantly reduced in Pea & Barley mixture compared with pure Pea cropping. Lentil & Pea mixtures have a very high gross margin potential, however this varies a lot across sites and years.

Pea and lentil cultivation result in higher plant available nitrogen content at harvest compared to pure barley cultivation, this is especially true for Pea & Barley cropping system.

Pea & Barley show slightly less root rot symptoms compared to pea pure stand.

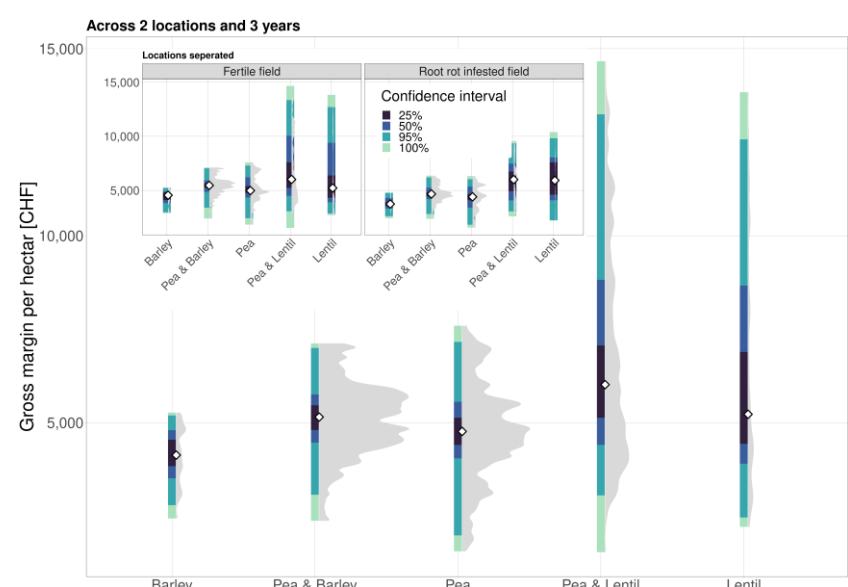


Fig. 1 Variation in gross margin for the different cropping systems at the two sites (shown together and separated) from 2020 till 2022.

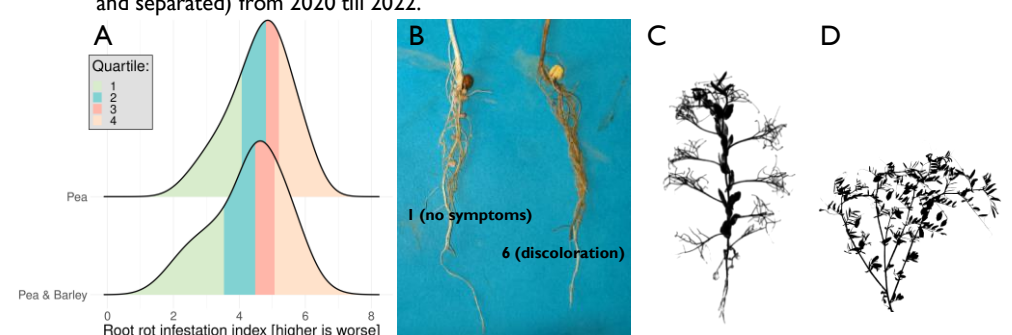


Fig. 3 A) Root-rot infestation index (with 1=no symptoms and 9=death plant) of pea roots in pea pure stand and mixed cropping of Pea & Barley at the root-rot infested site in 2020, 2021 and 2022, B) Examples of pea roots of different infection levels, C) Illustrated pea plant (image: Benedikt Haug) and D) lentil plant (image: Seraina Vonzun, FiBL).

Conclusions

- We show that mixed cropping of Pea & Barley and Lentil & Pea result in a decreased yield risk compared to pure stands of pea and lentil.
- Pea and lentil in mixed cropping systems and pure stands can result in considerable amount of nitrogen supply for the subsequent crops.
- This project highlights the potential of mixed cropping in the transition towards more sustainable agricultural systems.

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