

Optimising species complementarities in mixed cropping systems to secure local protein supply

Introduction

The cultivation of pea (*Pisum sativum* L.) and lentil (*Lens culinaris* Medik.) is important for the food and feed protein supply and like other legumes they have the ability to fix nitrogen (N) from the air and improve soil fertility and N-supply for subsequent crops. Yield of grain legumes are unstable among other factors due to lodging and soil-borne pathogens with recommended rotation breaks of up to 10 years.

In the project PROMISE (2020 – 2024) pea-barley and lentil-pea mixtures are investigated with the aim to enhance yield stability via mixed cropping.

Preliminary results of the first year

Pea - Barley

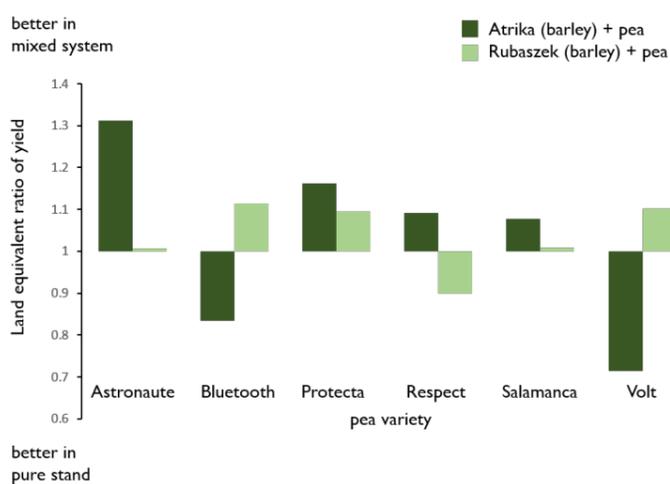


Fig. 1 – Land Equivalent Ratio (LER) of yield of 6 pea varieties in mixture with different barley varieties (ratio 80%/40%) of field trial in Kirchliindach (CH) 2020. $LER = (\text{yield culture A in mixture} / \text{yield culture A in pure stand}) + (\text{yield culture B in mixture} / \text{yield culture B in pure stand})$.

Objectives of the PROMISE project

- Compare total and protein yields of mixed and pure stands
- Investigate the effect of crop genotype on mixture performance
- Predict mixture performance by pure stand yield and phenotypic key traits
- Improve understanding on the effect of mixed cropping on disease and pest infestations and N-supply for the subsequent crop

Pea - Lentil

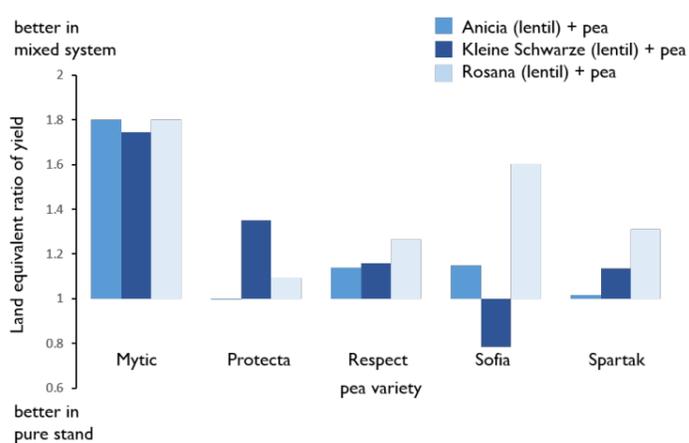


Fig. 2 – LER of yield of 5 pea varieties in combination with different lentil varieties (ratio 25%/75%) of field trial in Fislisbach (CH) 2020. $LER = (\text{yield culture A in mixture} / \text{yield culture A in pure stand}) + (\text{yield culture B in mixture} / \text{yield culture B in pure stand})$.



Fig. 3 – Left: Pot-based mixed cropping experiment in a greenhouse for a quick and inexpensive screen of plant-plant interactions and their dependence on differing levels of soil sickness. Middle: Lentil-pea mixture in the field trial in Fislisbach. Right: Impression of the field trial in Kirchliindach.

Outlook

- Analyse mixture performance on root rot disease in pot and field trials
- Investigate mixed cropping effects on N and biomass within crop rotation
- Investigate key traits to predict mixture performance (talk by Benedikt Haug, Parallel Session Seven A, Wed. at 11.06 am)

Funding partners