Does a mixture of pea varieties with different leaf morphology improve crop performance?

To cite this version:
Georg Carlsson, Laurent Bedoussac, Branko Cupina, Vuk Djordjevic, Noemie Gaudio, et al.. Does a mixture of pea varieties with different leaf morphology improve crop performance?. International Conference on advances in grain legume cultivation and use, Sep 2017, Novi Sad, Serbia. hal-02786810
Does a mixture of pea varieties with different leaf morphology improve crop performance?

Why is European grain legume cultivation so low?

- Low/variable yields; comparatively low profitability
- Sensitivity to weeds, pests and diseases
- Insufficient awareness about rotational benefits
- Poor interest from breeders and consumers (but increasing)

Faba bean in field experiment. Photo: G Carlsson

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Faba bean in field experiment. Photo: G Carlsson
Economic and environmental costs for weed control.

Lodging still occurs, although less in modern cultivars.

Abundant weed growth in faba beans and lodged peas. Photos: G Carlsson
Complementarity in grain legume-cereal intercropping enhances crop performance


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Additional benefits of intercropping:
reduced lodging

Lentil/oat

Pea/barley

photos: G Carlsson
But intercropping means separating grains if the harvest is to be sold...

And there are concerns about crop rotation effects...

what about within-species crop diversification?

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Can a grain legume variety mixture express benefits that are known from intercropping?

Semi-leafless pea intercropped with wheat. Photo: A Ton

Normal-leafed pea intercropped with wheat. Photo: D Zivanov

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Hypotheses:

A variety mixture of leafless and normal-leafed pea genotypes

1. reduces weed abundance compared to a pure stand of semi-leafless pea;
2. improves lodging resistance compared to pure stand of normal-leafed pea
• Field experiments at four sites x two growing seasons
• Serbian pea genotypes: 1) Dukat (normal-leafed) and 2) Partner (semi-leafless) grown at all sites, along with local genotypes
• Sole crops, variety mixtures and pea/wheat intercrops
• Data on grain yields, weed biomass and lodging
Yield

- Weed biomass
- Wheat grain yield
- Pea grain yield

Grain yield/weed biomass kg DM ha⁻¹, mean+/− SE n=4

2015

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Grain yield / weed biomass

- weed biomass
- wheat grain yield
- pea grain yield

Grignon 2017
Grignon 2017

Grain yield / weed biomass (kg DM ha⁻¹, mean ± SE n=3)

- weed biomass
- wheat grain yield
- pea grain yield

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Carlsson et al. Crop performance of pea variety mixtures.
Toulouse, overview of results

Small and inconsistent benefits of variety mixtures compared to pure pea cultivars

Pea lodging was reduced in intercrops, especially in case of dramatic hail storm (second year)
Conclusions

• Pea variety mixtures were not efficient for stabilizing yields or reducing weed abundance
• Small improvement of lodging resistance in variety mixtures
• Cereal intercropping more efficient than pea leaf type diversity for reducing weeds and preventing lodging

Photo: A Ton

Photo: D Zivanov
The presented research is supported by funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613551.