



HAL
open science

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

Georg Carlsson, Laurent Bedoussac, Branko Cupina, Vuk Djordjevic, Noemie Gaudio, Eric-Steen Jensen, Marie-Helene Jeuffroy, Etienne-Pascal Journet, Eric Justes, Aleksandar Mikic, et al.

► 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

HAL Id: hal-02786810

<https://hal.inrae.fr/hal-02786810v1>

Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



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

G. Carlsson, L. Bedoussac,
B. Cupina, V. Djordjevic,
N. Gaudio, E.S. Jensen,
M-H. Jeuffroy, E-P. Journet,
E. Justes, A. Mikic,
E. Pelzer, D. Zivanov





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



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



Economic and environmental costs for weed control.

Lodging still occurs, although less in modern cultivars.

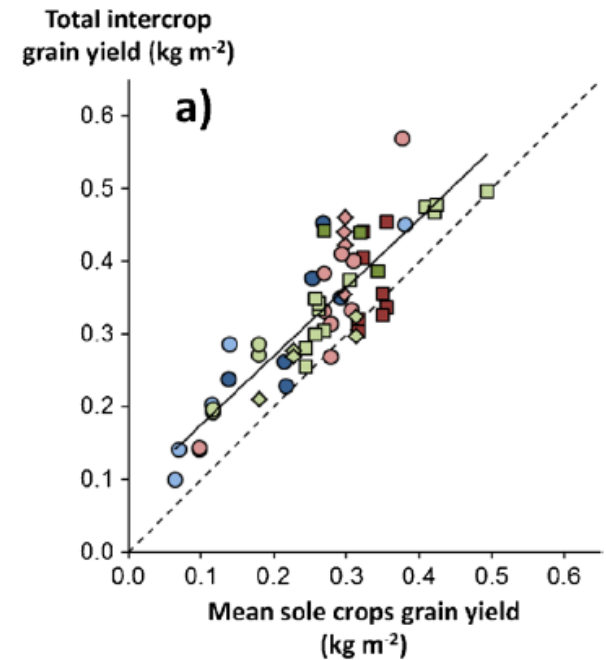
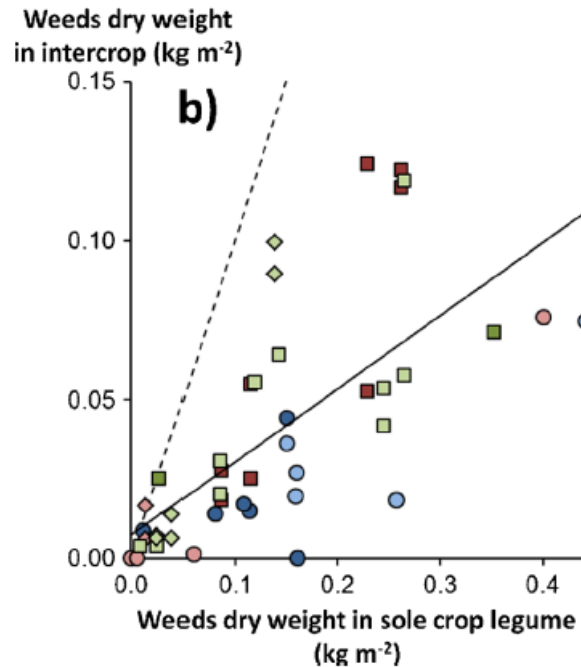


Abundant weed growth in faba beans and lodged peas. Photos: G Carlsson

Complementarity in grain legume-cereal intercropping enhances crop performance



Pea/barley intercrop.
Foto: ES Jensen



Bedoussac et al. 2015. Agron. Sustain. Dev. 35, 911-935.

Additional benefits of intercropping: reduced lodging



Lentil/oat



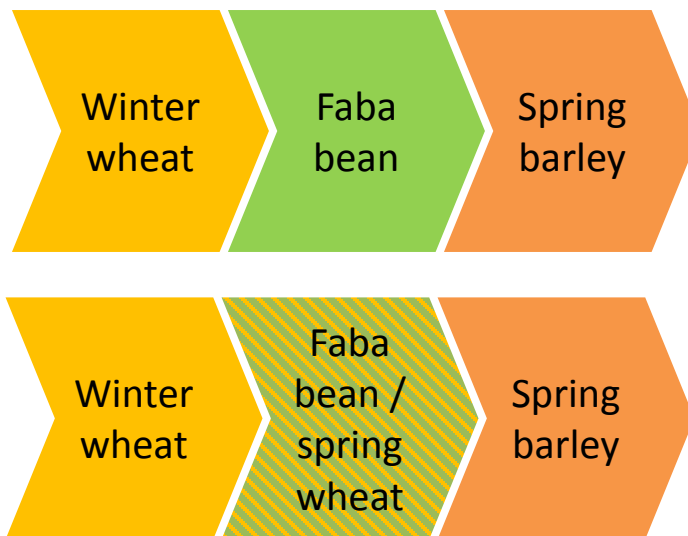
Pea/barley

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?



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



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



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



Hypotheses:

A variety mixture of leafless and normal-leaved 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-leaved pea

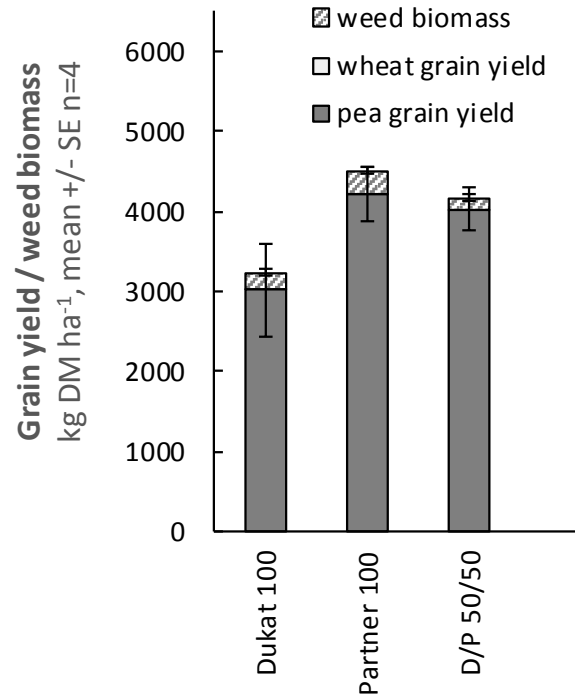


- Field experiments at four sites x two growing seasons
- Serbian pea genotypes:
 - 1) Dukat (normal-leafed) and
 - 2) Partner (semi-leafless)grown at all sites, along with local genotypes
- Sole crops, variety mixtures and pea/wheat intercrops
- Data on grain yields, weed biomass and lodging



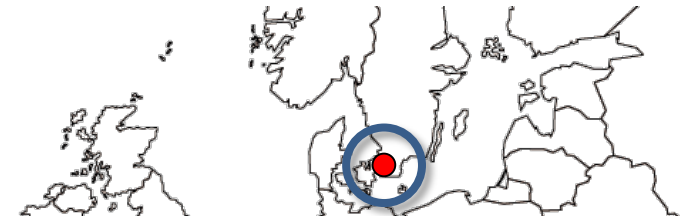


Yield

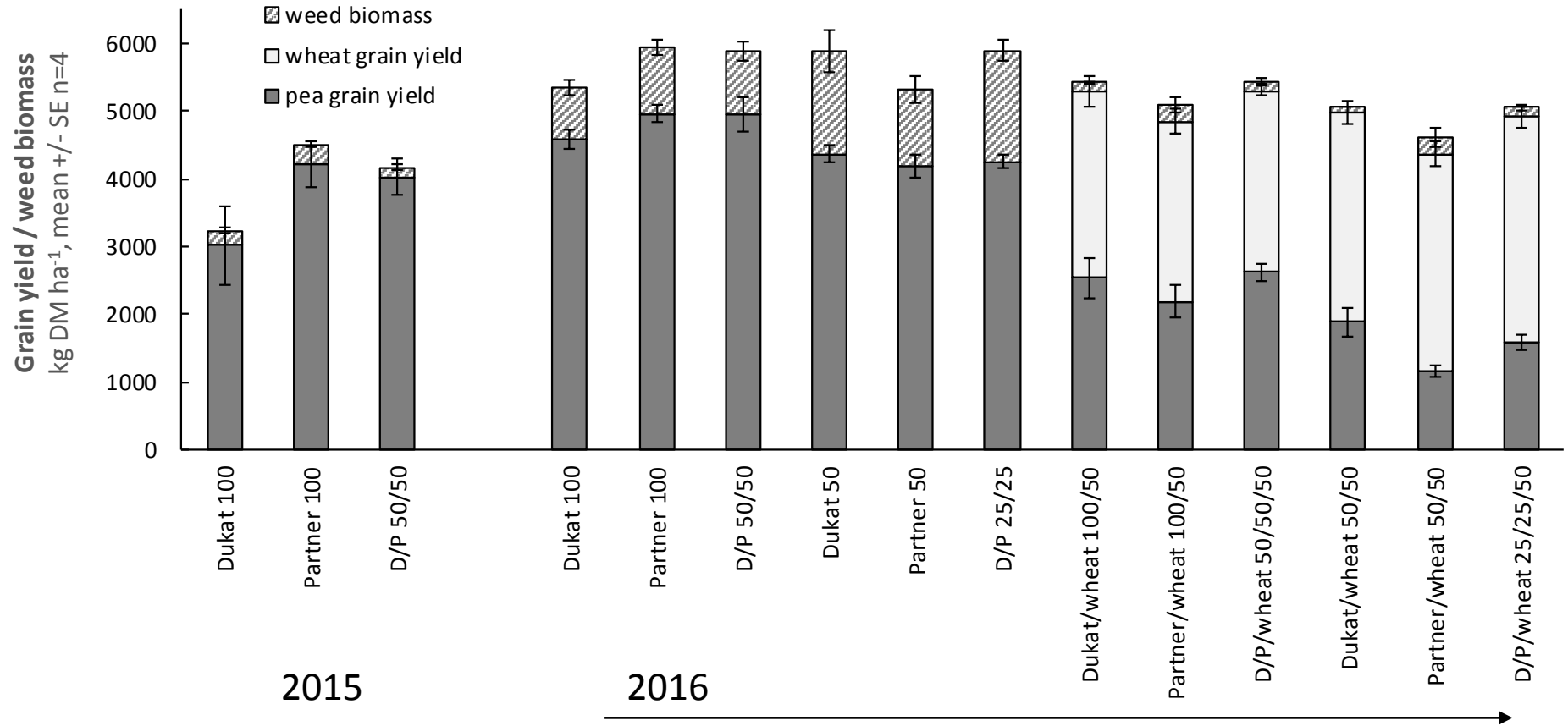


2015



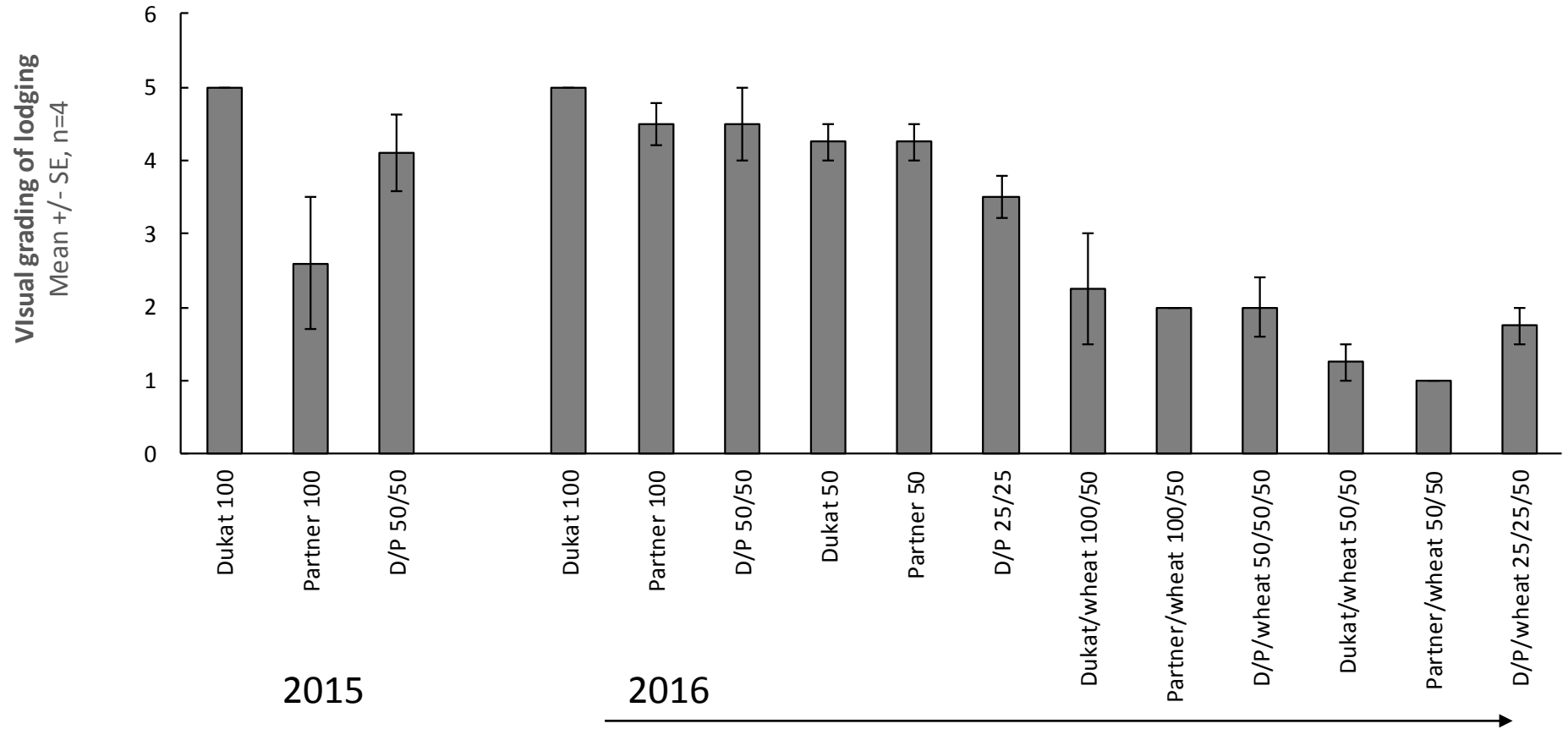
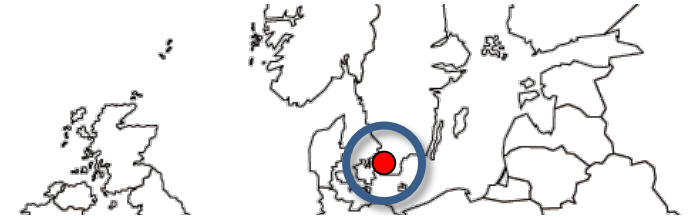


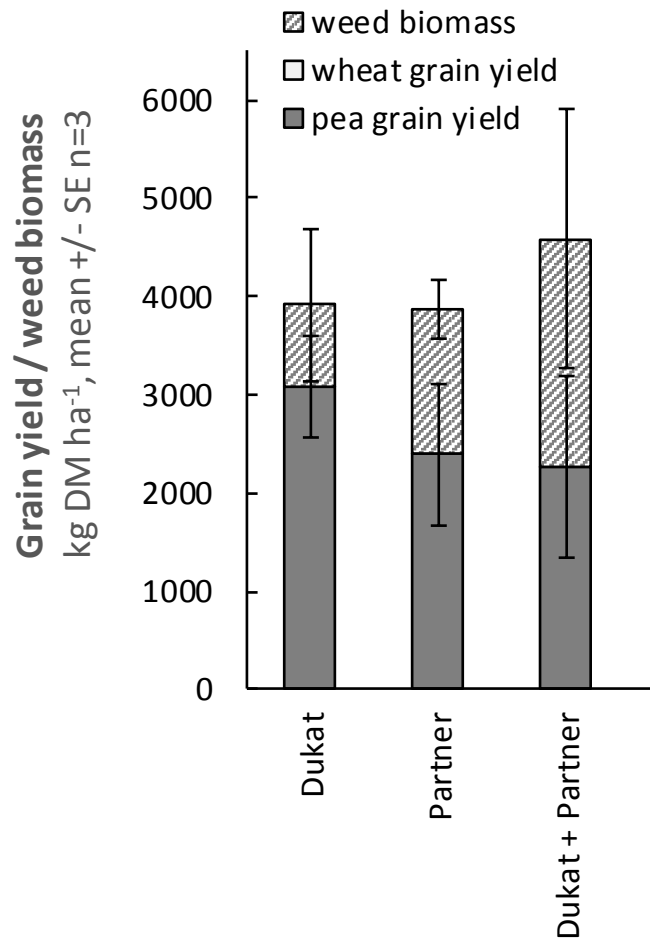
Yield





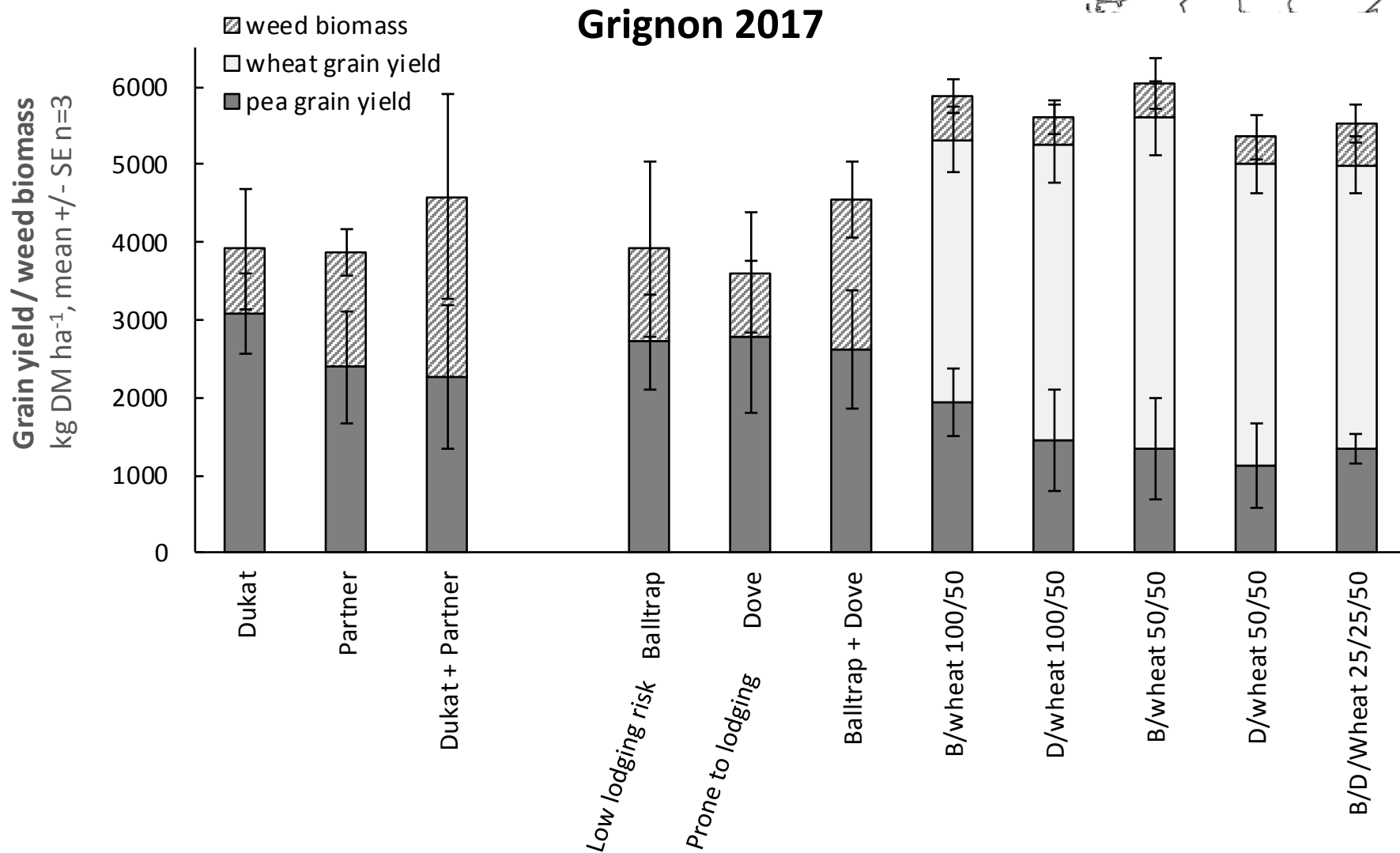
Lodging

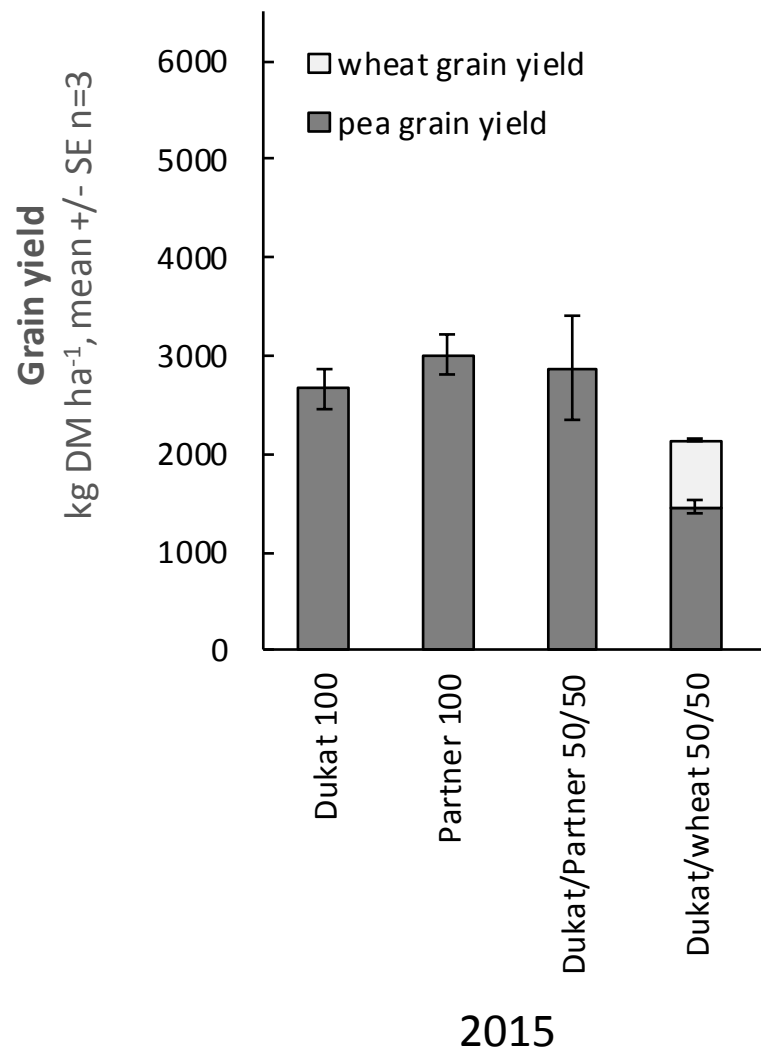




Grignon 2017

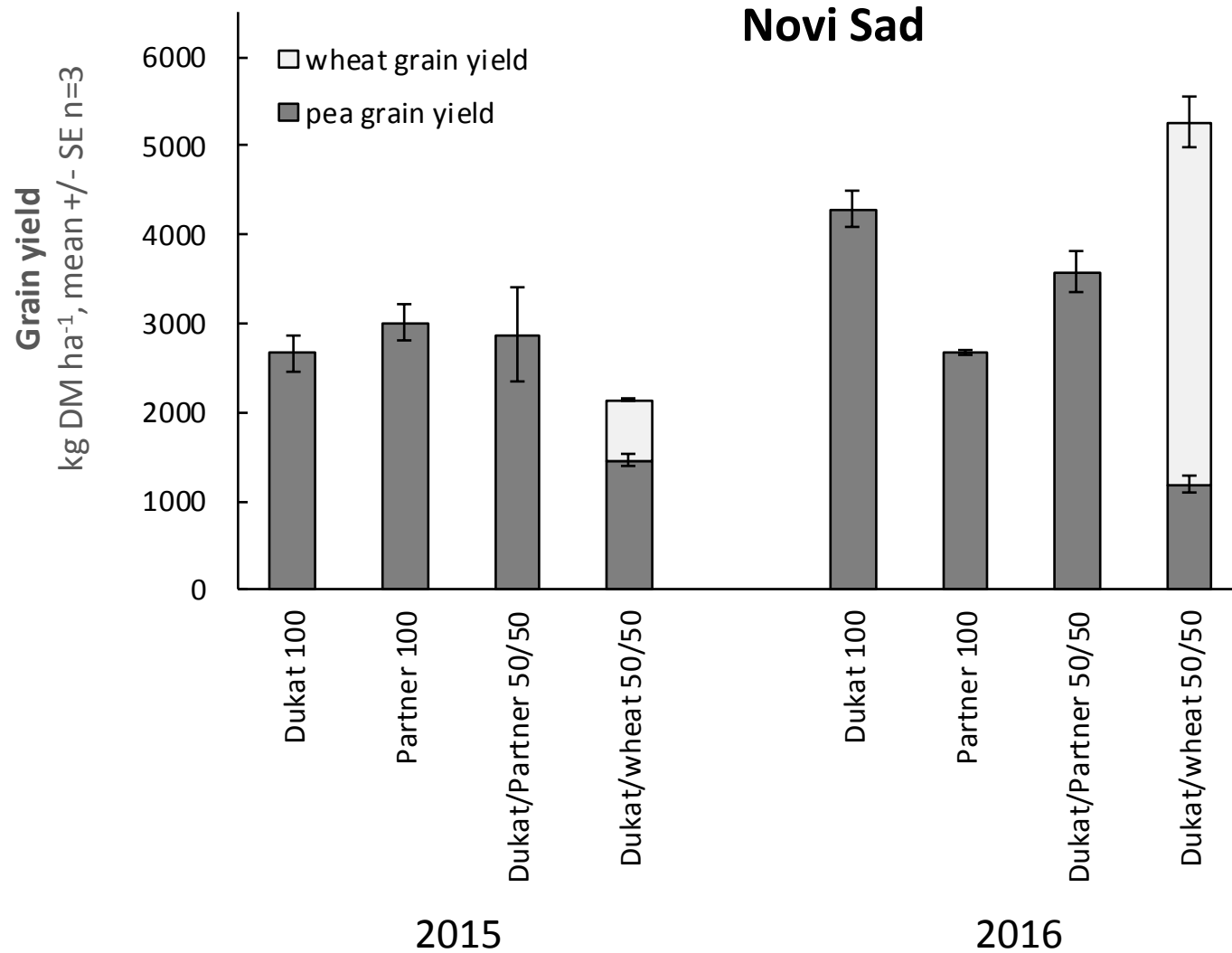






Novi Sad







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

Thank you!



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.