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## 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.

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

G. Carlsson, L. Bedoussac,  
B. Cupina, V. Djordjevic,  
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# 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.  
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Economic and environmental costs for weed control.

Lodging still occurs, although less in modern cultivars.



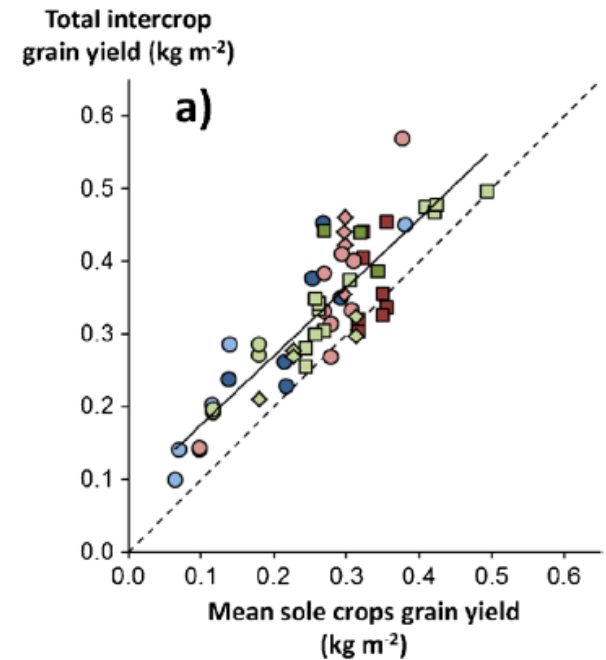
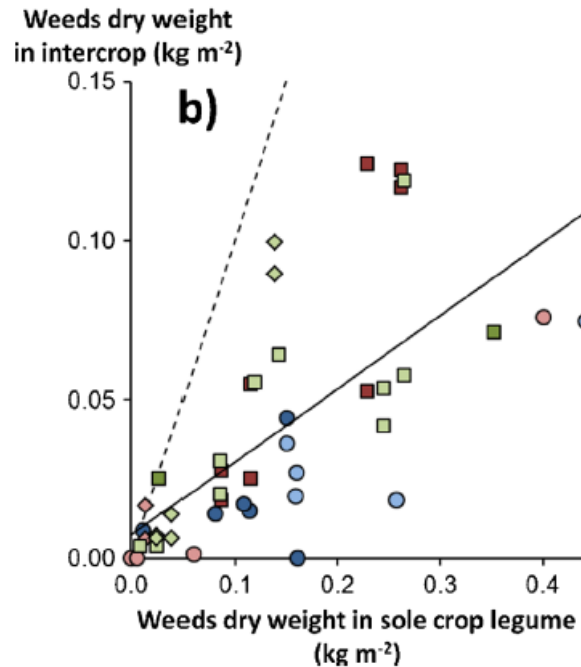
Abundant weed growth in faba beans and lodged peas. Photos: G Carlsson

## 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



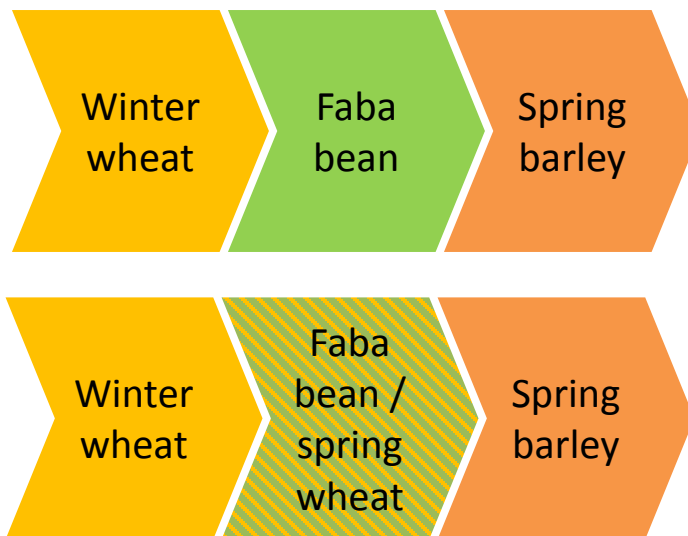
Pea/barley

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

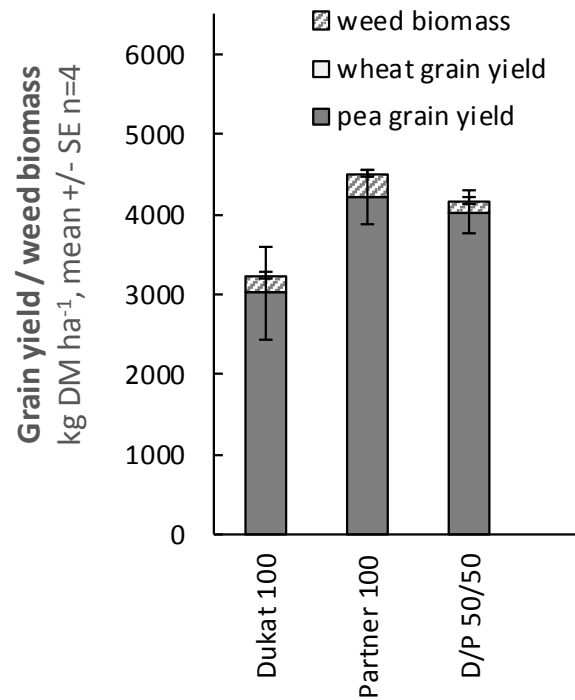


- Field experiments at four sites x two growing seasons
- Serbian pea genotypes:
  - 1) Dukat (normal-leafed) and
  - 2) Partner (semi-leafless)grown at all sites, along with local genotypes
- Sole crops, variety mixtures and pea/wheat intercrops
- Data on grain yields, weed biomass and lodging



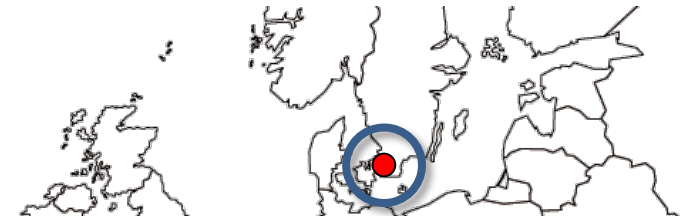


## Yield

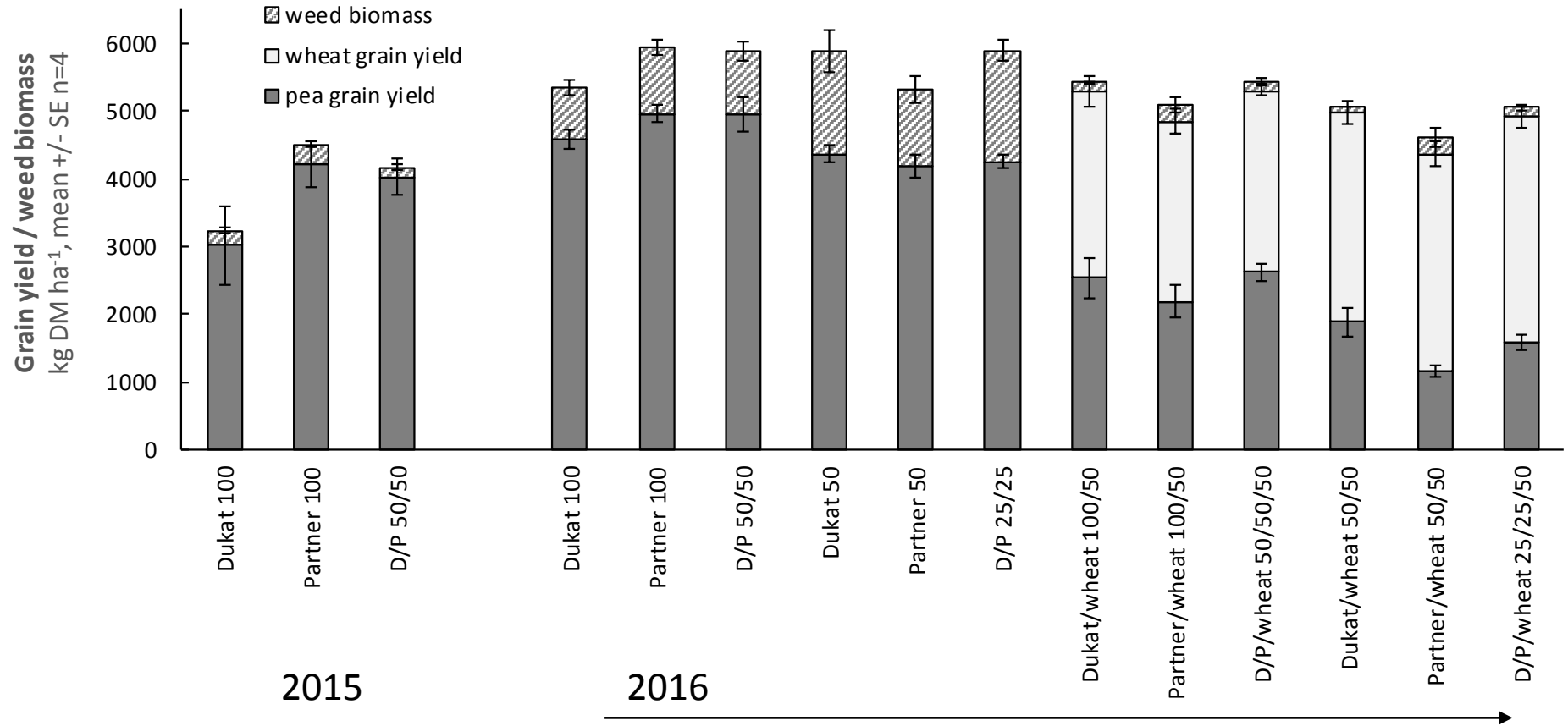


2015



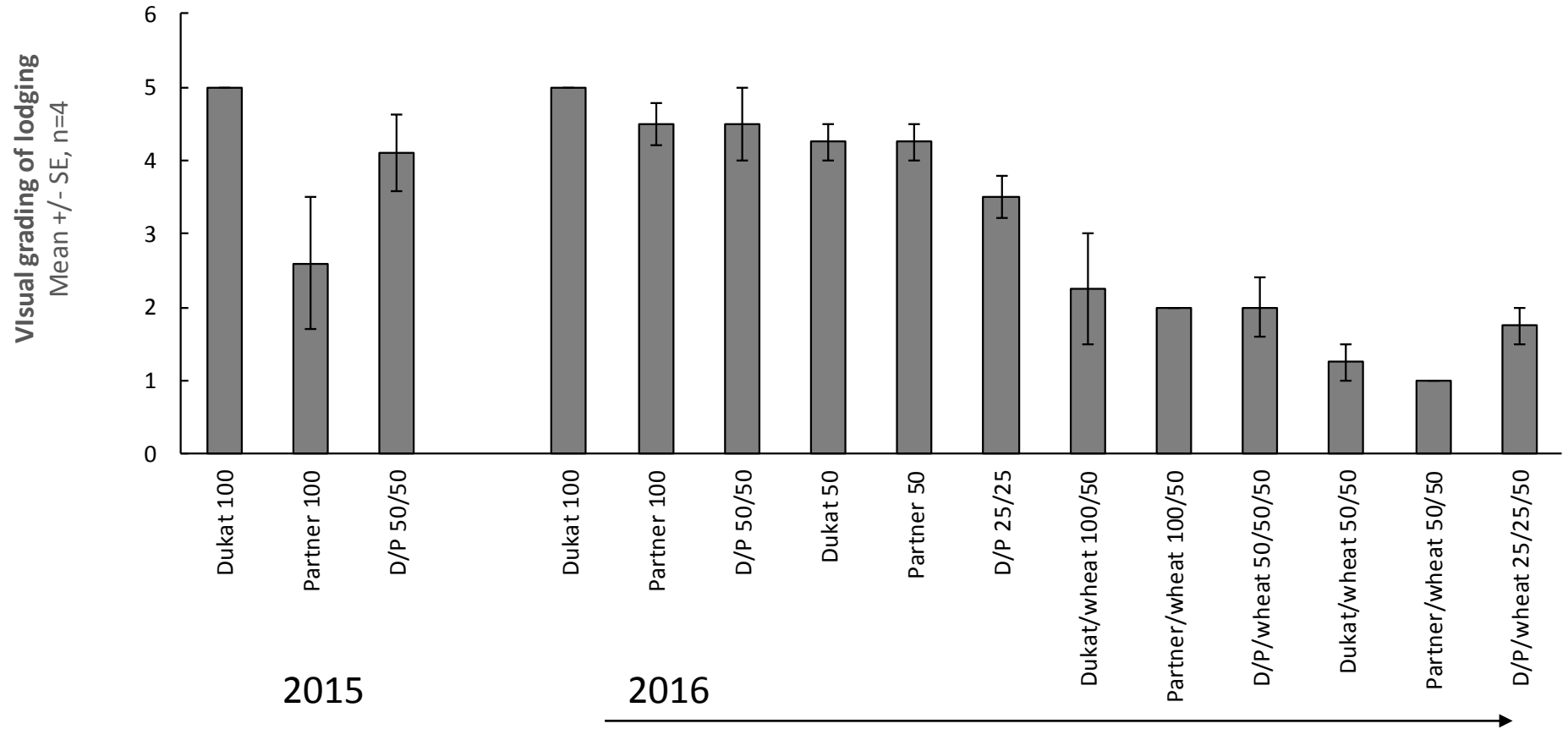
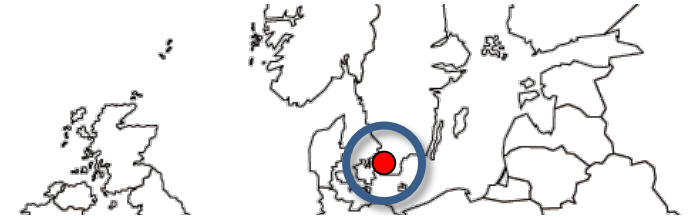


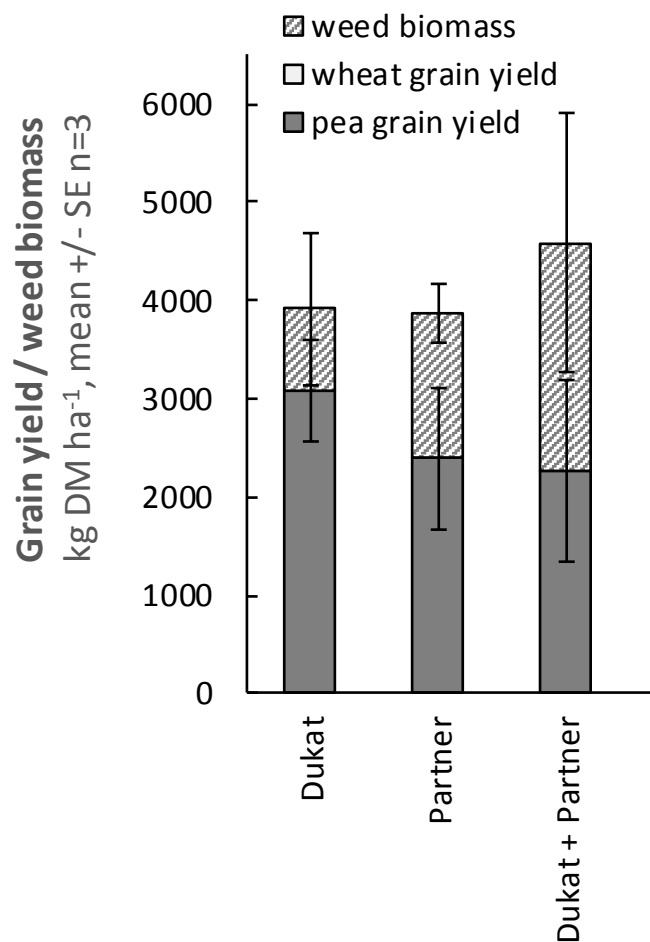
## Yield





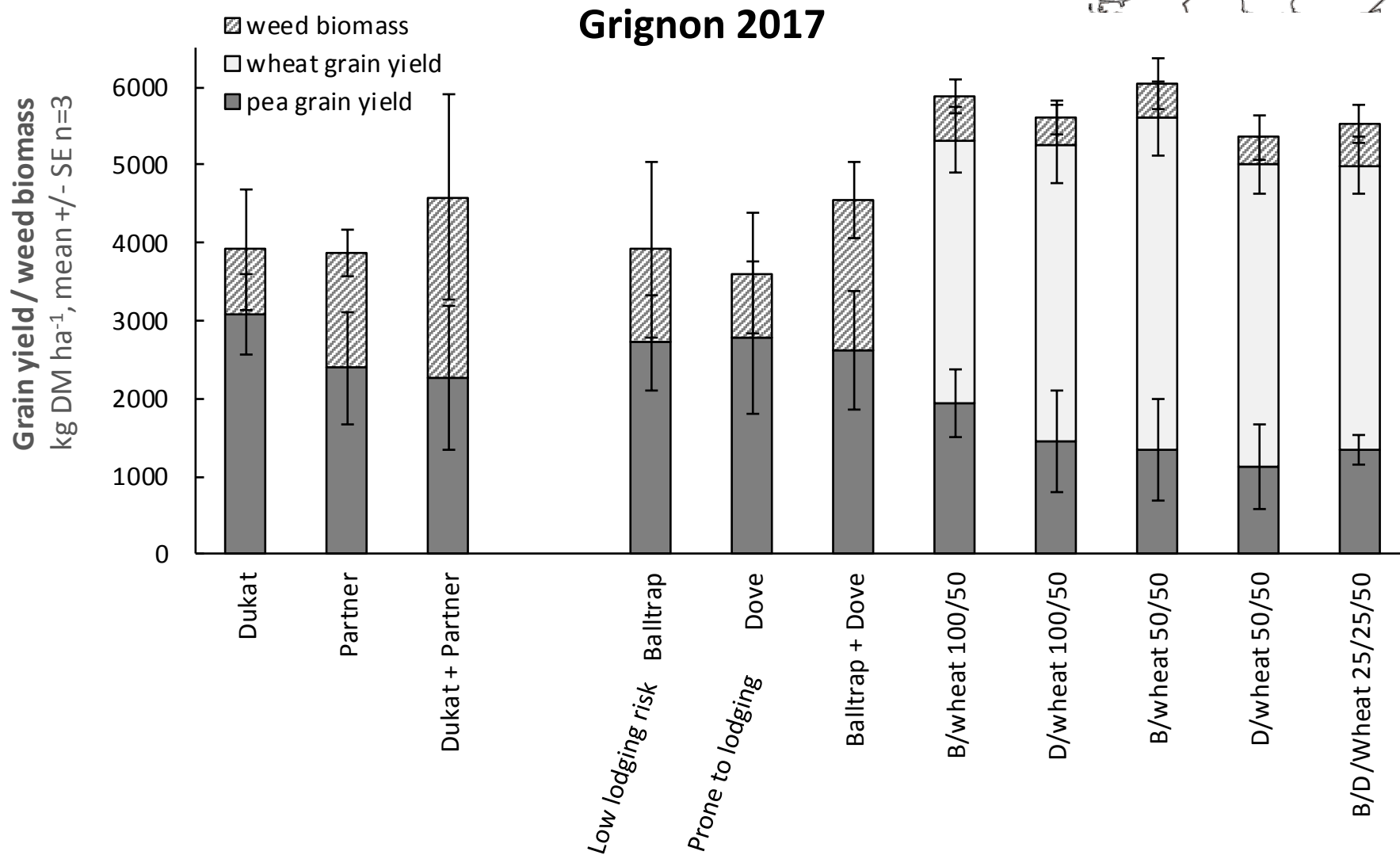
## Lodging



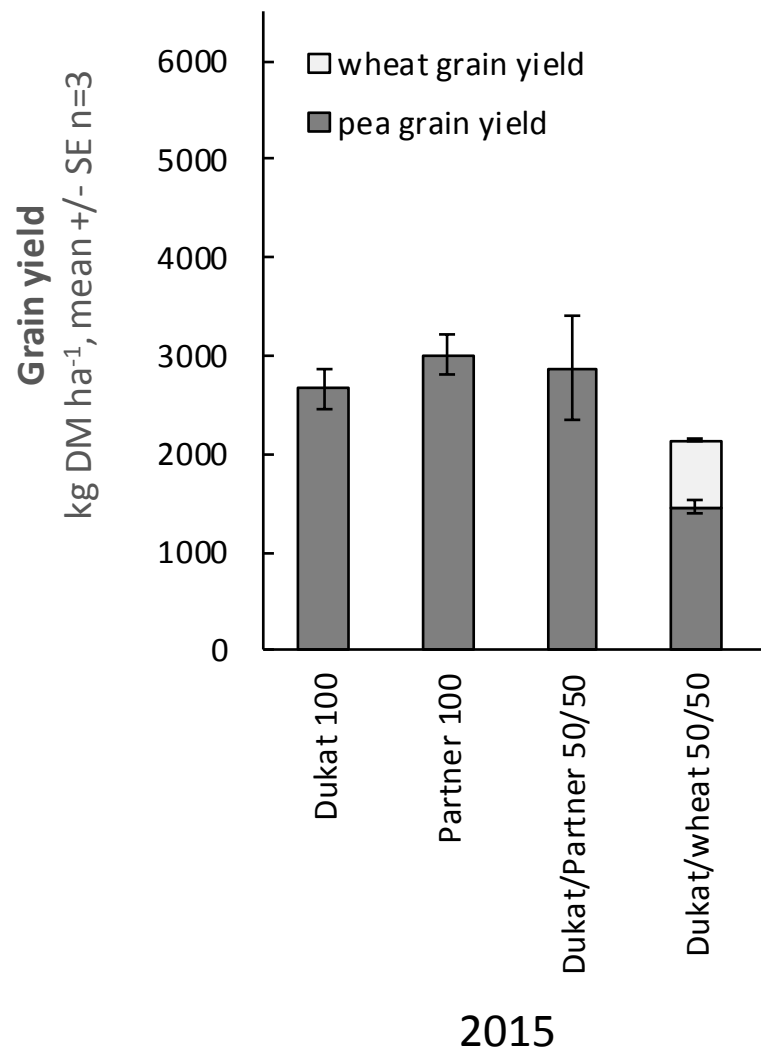


## Grignon 2017



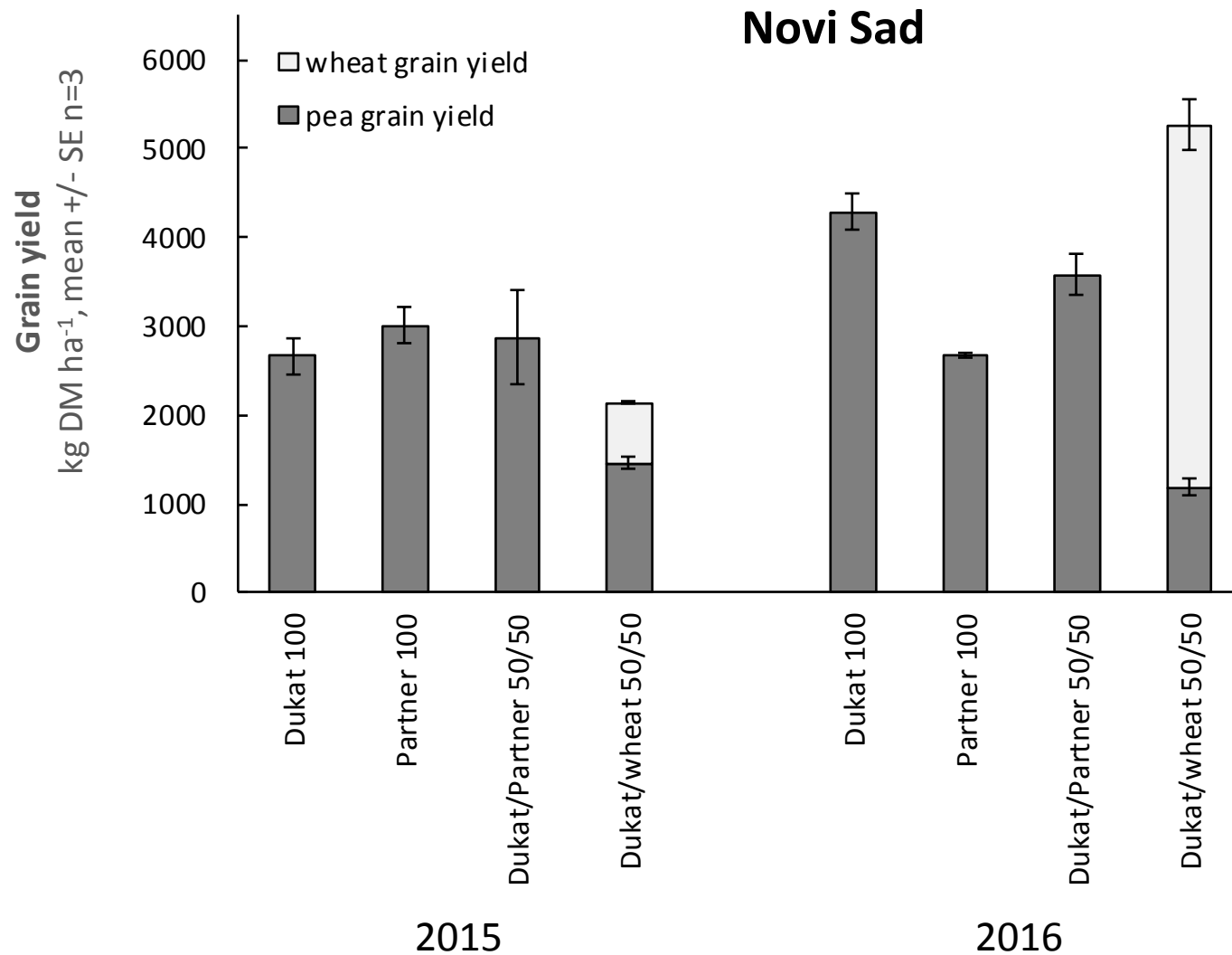






## Novi Sad







## 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

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