

# Pea-barley intercrops use nitrogen sources 20-30% more efficiently than the sole crops

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For further informations see [www.intercrop.dk](http://www.intercrop.dk)



## Objective

- Define intercropping strategies for sustainable plant production management in organic farming under different regional conditions in Europe
  - To determine crop nitrogen (N) dynamics in pea-barley intercrops compared to sole crops
    - Intercrop N acquisition (soil and atmosphere) and balances
    - Post-harvest N dynamics in the soil
    - Risk of N leaching
    - Succeeding wheat N accumulation incl. economic effects
    - Phosphorous, potassium and sulfur accumulation

**Three years mean:** 2003-2005

**Five countries:** Denmark (DK);  
United Kingdom (UK); France (FR);  
Germany (GE); Italy (IT)

**Four replicates**

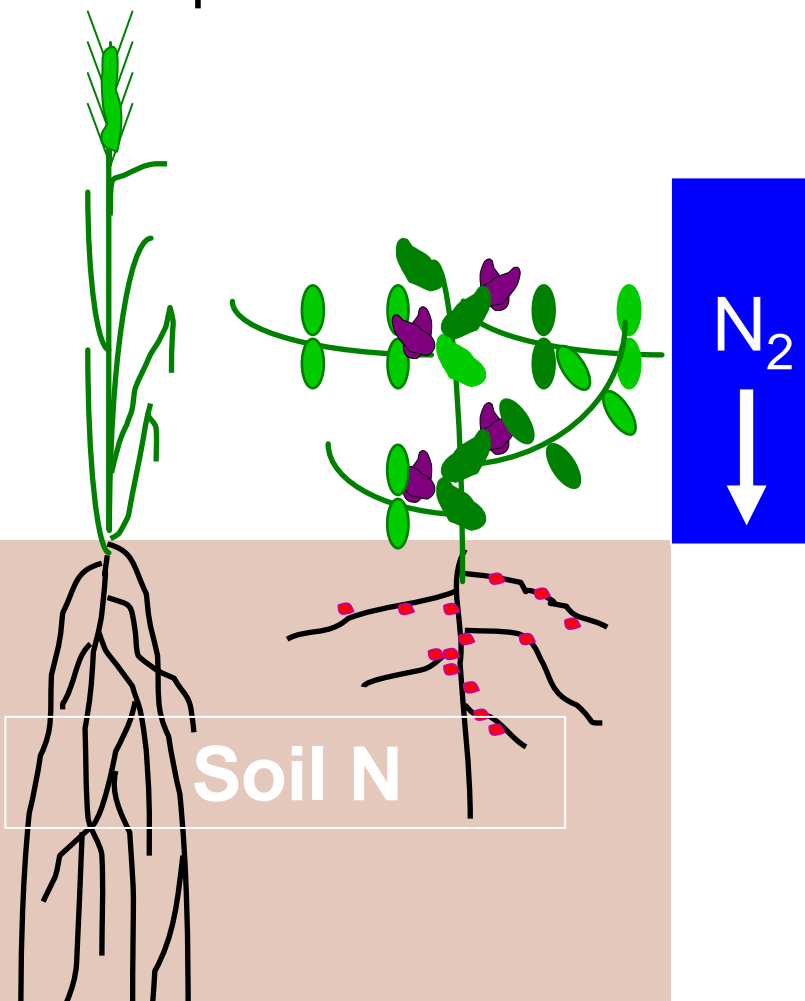


# Pea-barley intercropping and N dynamics

- Intercropping: the simultaneous cultivation of more than one species on the same piece of land.

N leaching data is not included in the present talk

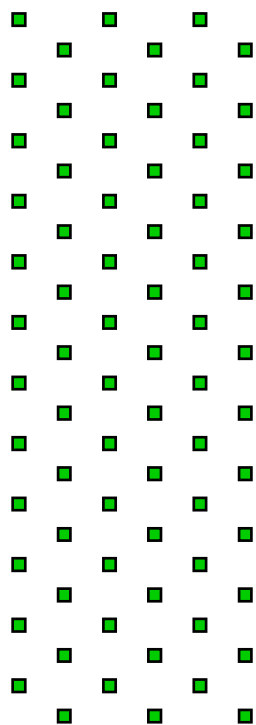
Drainage →



# Intercrop project field experimental design

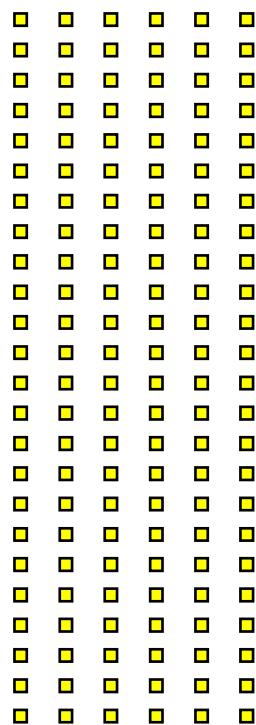
## Sole cropping

P100



90 pl. m<sup>-2</sup>

B100



300 pl. m<sup>-2</sup>

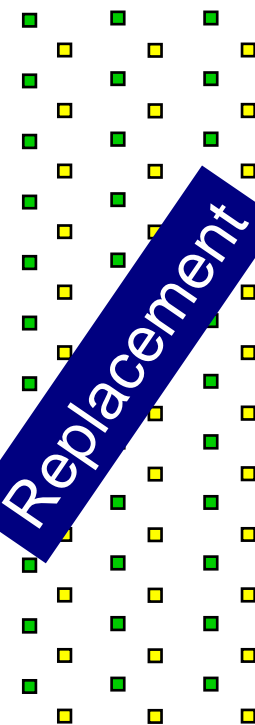
## Row-by-row intercropping

P100B50



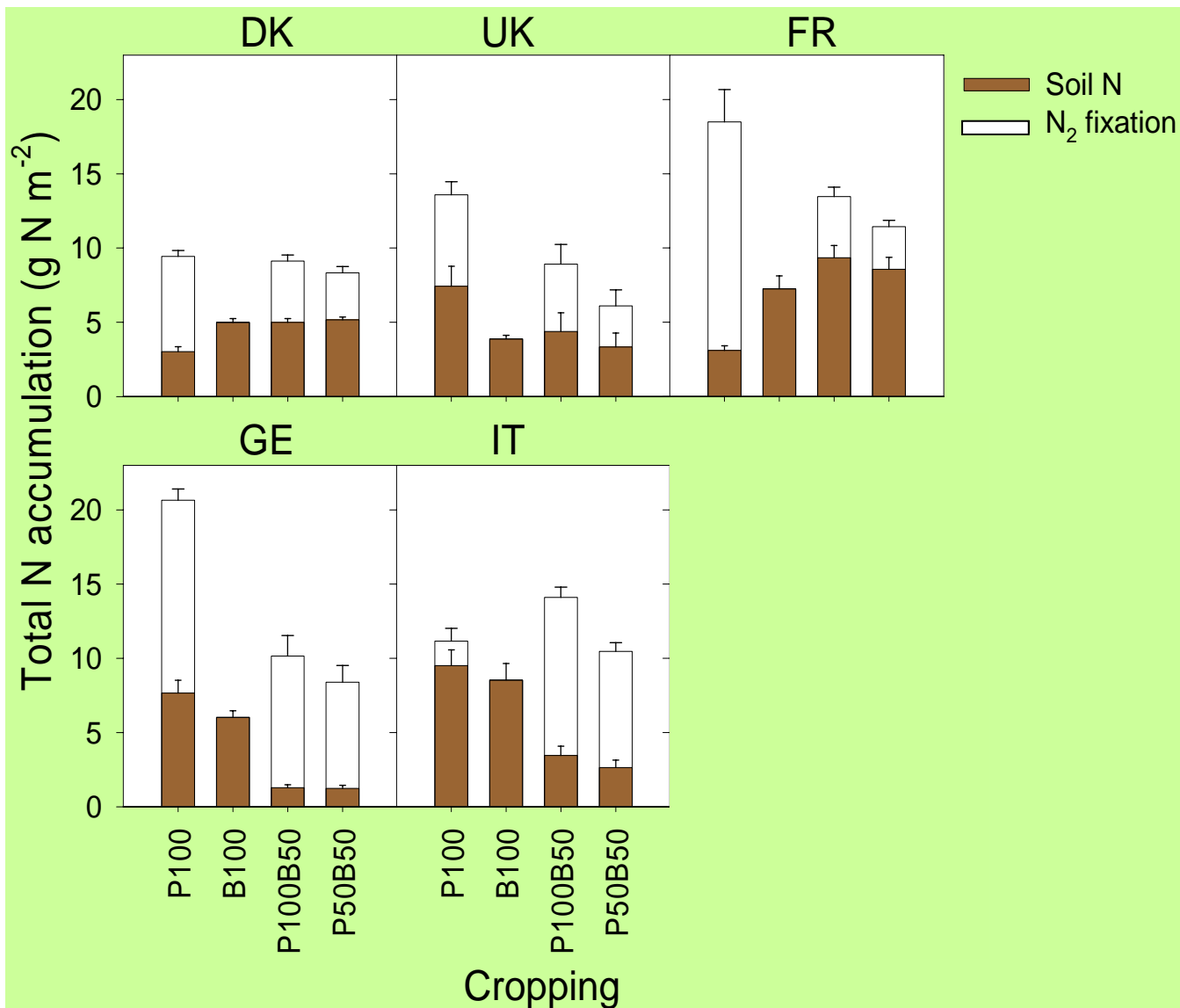
90+150 pl. m<sup>-2</sup>

P50B50

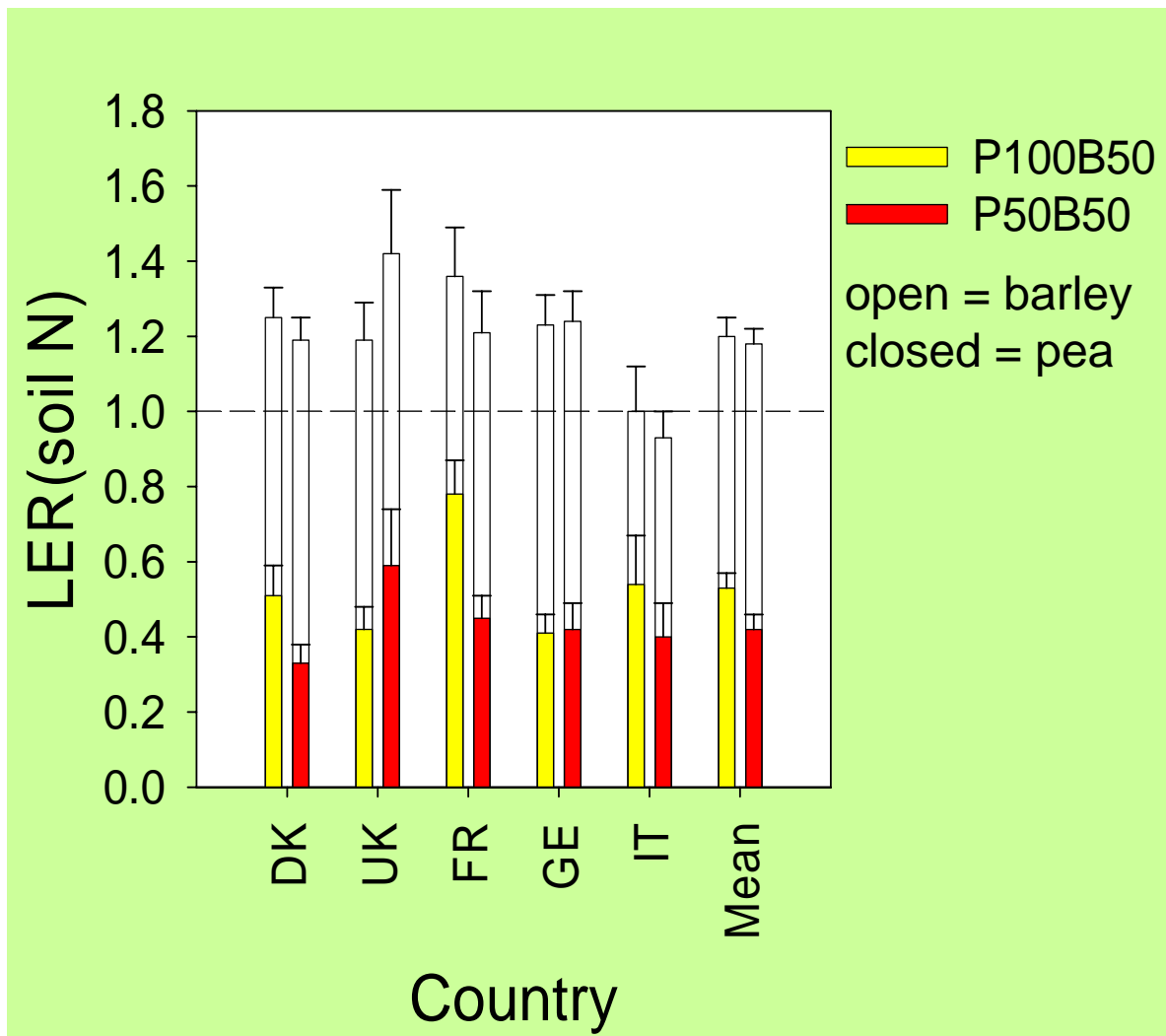


45+150 pl. m<sup>-2</sup>

# Soil and atmospheric nitrogen use

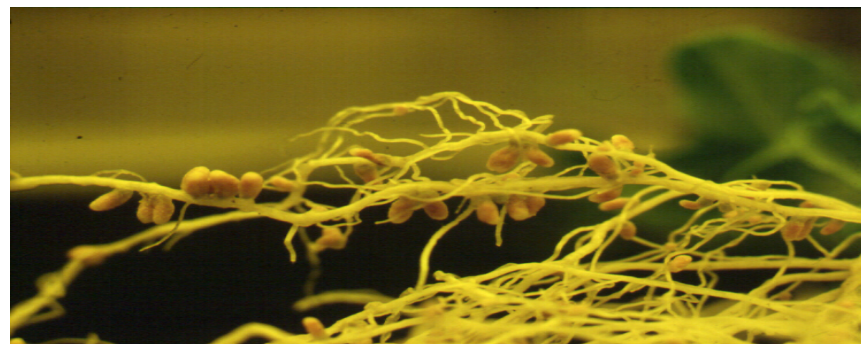


# Utilization of soil mineral N

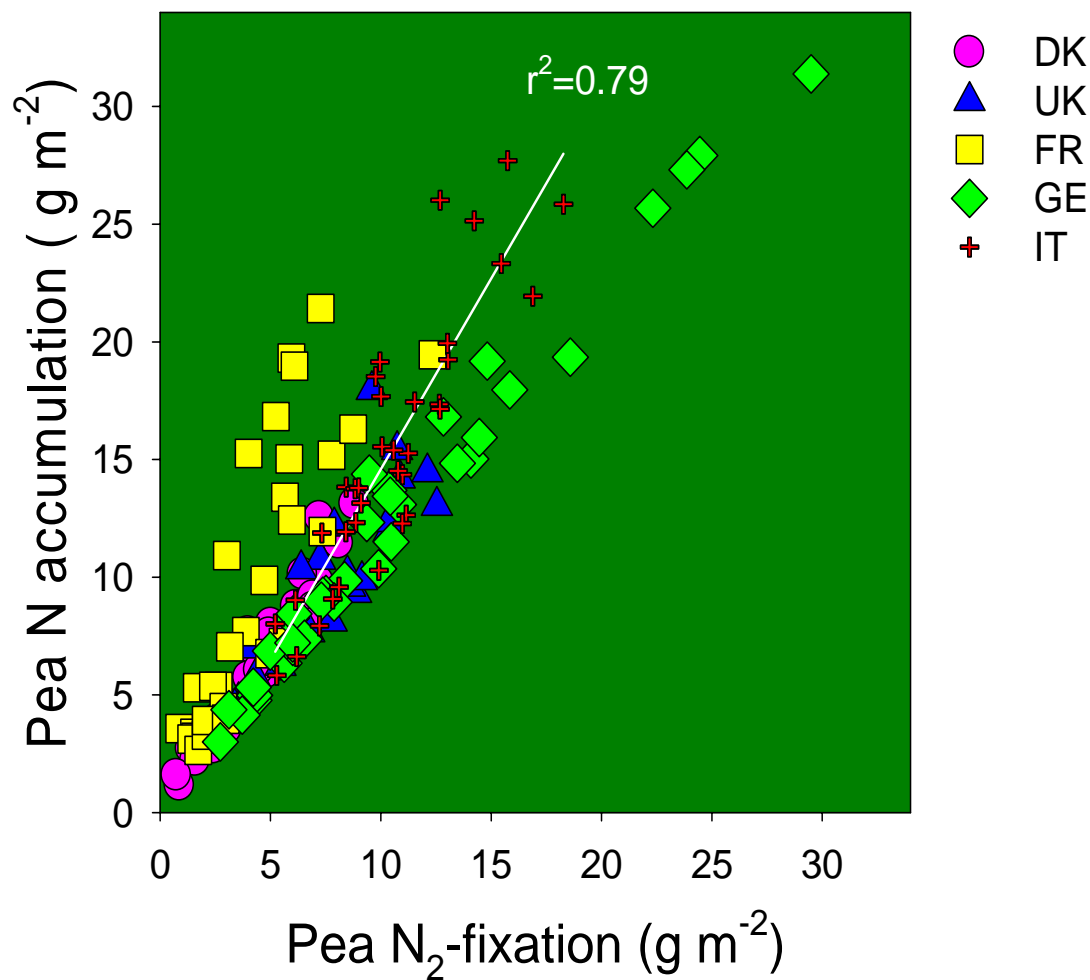


## Final percent of total N derived from N<sub>2</sub>-fixation (%Ndfa)

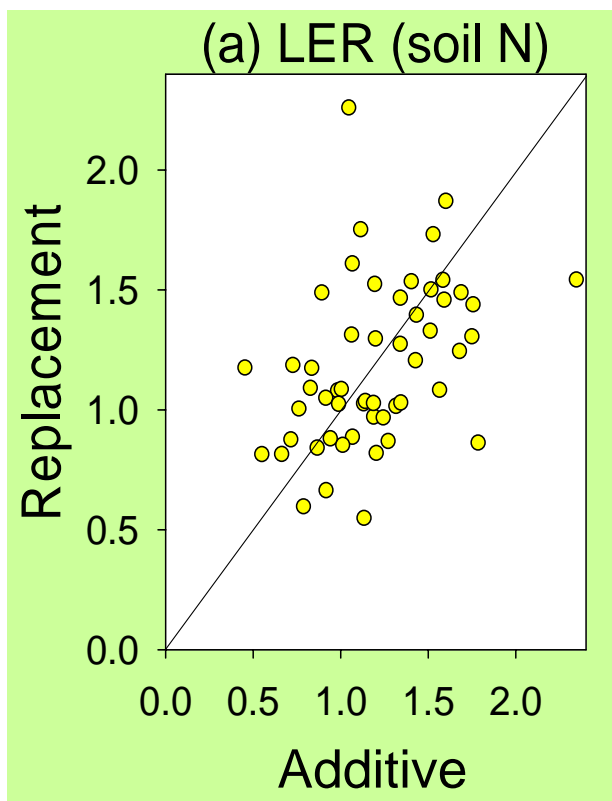
Country	P100	P100B50	P50B50
DK	68	75	75
UK	72	83	79
FR	47	46	52
GE	81	86	84
IT	63	75	76
All	66	73	73



# ...how to raise N<sub>2</sub>-fixation inputs?



# Intercrop design and N use



## Conclusion

1. Overall nitrogen sources was used 20-30% more efficiently by pea-barley intercrops than by the respective sole crops
2. Except in Italy - 20 to 40% more efficient soil mineral N uptake was achieved by the intercrops as compared to the sole crops
3. Relative greater crop soil N uptake in barley than pea force pea to rely on N<sub>2</sub>-fixation when intercropped
4. Increasing N<sub>2</sub>-fixation inputs require management practices that increase N demand by pea
5. Intercrop design is only one of several management tools to adapt when optimizing local plant growth factor accumulation

When including N leaching risks (using STICS model) and subsequent wheat N accumulation the dynamics is assessed at the rotation level and not only at the crop level.

...thanks for your attention

