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Wheat production in Switzerland under climatic and nitrogen-fertilizer restrictions

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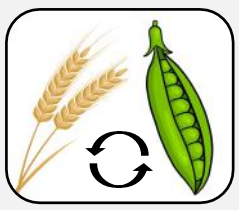
1 Motivation & Method

Motivation: help wheat production face major challenges, particularly increased rainfall variability and reduced use of nitrogen (N) fertilizer.

Objective: quantify the effect of crop management practices and traits on grain yield of winter wheat.

Methods: seasons 2018-19, 2019-20 and 2020-21

Water availability
rainfed and rainout shelter (~40% of rain intercepted during grain filling)



Crop rotation
barley, oilseed rape and pea

N applied
not fertilized and conventional (up to 180 kg N ha^{-1})

Genotype
Allez-Y, Apache, Cellule and CH-Nara

The experimental design was strip-split-plot with three replicates. Soil sampling was done in February to assess soil mineral N availability and adjust N fertilization dose. Significant effects were identified by analyses of variance.

2 Main results

Genotype was the factor with the highest impact on grain yields, while the rainout shelter had no effect on it or on yield components. Differences between N treatments occurred mostly in 2021.

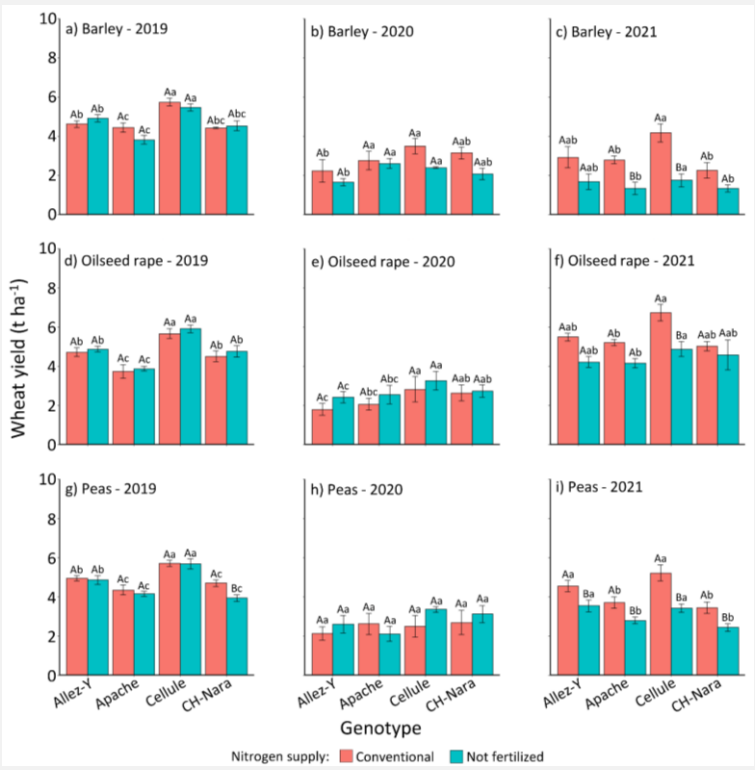


Figure 1. Mean grain yields and standard error of winter wheat genotypes by year, pre-crop and nitrogen treatments. (Means with the same letter within nitrogen treatments (uppercase) or genotypes (lowercase) are not significantly different at p<0.05).

3 Conclusion

The rainout shelters intercepted around 40% of the rain, but further investigation on crop demand and precipitation is needed to draw conclusions. Experiments considering greater drought and different stages of wheat development are essential.

4 Contribution to Sustainable Food Systems

Promote sustainable agriculture

Analysis of climate change impacts

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