



# Screening Crop Wild Relatives of Pea under field conditions

## Improving on-field Phenotyping of Pea-CWR with a fence-based system

### Introduction

*To generate reliable data for selection in plant breeding, phenotyping of traits like growth habit and disease expression in the target environment is crucial. Often, cultivation of CWR and CWR-based breeding progeny in plot-based field trials is agronomically difficult. The organic plant breeder GZPK established a fence-supported screening system for application in on-field pea breeding nurseries.*



### Objectives

While high-throughput phenotyping platforms provide precision and scalability under controlled conditions, they remain costly and sometimes insufficiently mimic the complexity of biotic and abiotic stress factors occurring in the field. Replicability of results under field conditions is thus often limited.

Field-based phenotyping of peas based on plot and row sowing better reflects agricultural conditions but masks the agronomic potential of individual plants

due to high plant density and inhomogeneous field conditions. This challenges the identification of superior single plants.

A fence-supported screening system for evaluation of single-plant pea genotypes in the target cultivation system has been developed to enhance observability of individual plants. It allows precise assessment of traits such as plant architecture and health, while being cost-effective and practicable for large numbers of plants.





## Results

GZPK established a fence-based system to evaluate and select Pea-CWR and CWR-based breeding progeny in the field. A spacing of ~ 12 cm in single rows (hand-sown) allows improved and homogeneous establishment of single plant phenotypes compared to drill sown plots. Fences provide vertical support, preventing lodging under low-density growing conditions. Weeds are controlled manually and with landscape fabric. The system improved the reliability of phenotypic assessment in the target environment at the single-plant level. Management requirements are substantially lower than in pot-based trials under semi-controlled conditions of comparable scale. Labor input is mainly required for sowing and weed control. Challenges include spatial variability within the field and the need for effective weed management.

## Recommendations

The fence-based system offers a practical and cost-effective method to screen Pea-CWR and perform pea breeding activities under field conditions. Breeders can use it to assess and select single plants from segregating populations, increasing the likelihood to identify truly superior plants. Optimizing spacing between fence lines and plants, as well as usage of weed control fabrics allows for small maintenance efforts and facilitation of good conditions for data collection. The insights gained contribute to pea breeding programs through effective screening and use of CWR and CWR-based breeding material.

## Further reading

- Pea Breeding at GZPK: <https://www.gzpk.ch/pflanzenzuechtung/kulturen/leguminosen/erbsen/?lang=en-US>
- Rui Z., Zhang Z., Chen T. (2024). A Review of Field Plant Phenotyping Platform, Sensing and Navigation Technology. In: Zhang Z. et al. (eds.), Transforming Technologies in Smart Agriculture. Smart Agriculture, Vol. 8, Springer. [https://doi.org/10.1007/978-981-97-4141-0\\_1](https://doi.org/10.1007/978-981-97-4141-0_1)

