



Introduction

New fungal diseases often spread in **meadow orchards** due to application restrictions of fungicides. Apple blotch, which is caused by *Diplocarpon coronariae*, is increasingly becoming a problem in Germany. **The cultivation of robust varieties** can be a sustainable method of prevention, but there are few studies on the resistance of **historical apple cultivars** suitable for planting in orchards.

About **750 apple cultivars** held by the German fruit Genebank (DGO) are examined in order to identify **blotch-resistant varieties**. The first cultivars have been identified which exhibit lower symptoms than the **susceptible cultivar 'Golden Delicious'** (Fig. 1).

Aim of the study:

Evaluation of **all the accessible apple cultivars** of the DGO for their susceptibility in **detached leaf assay** by the end of 2022

Comparative greenhouse tests of **less susceptibility and high susceptible cultivars** by inoculation of grafted plants in 2023

GWAS analysis to identify genomic regions associated with the resistance to **apple blotch disease**

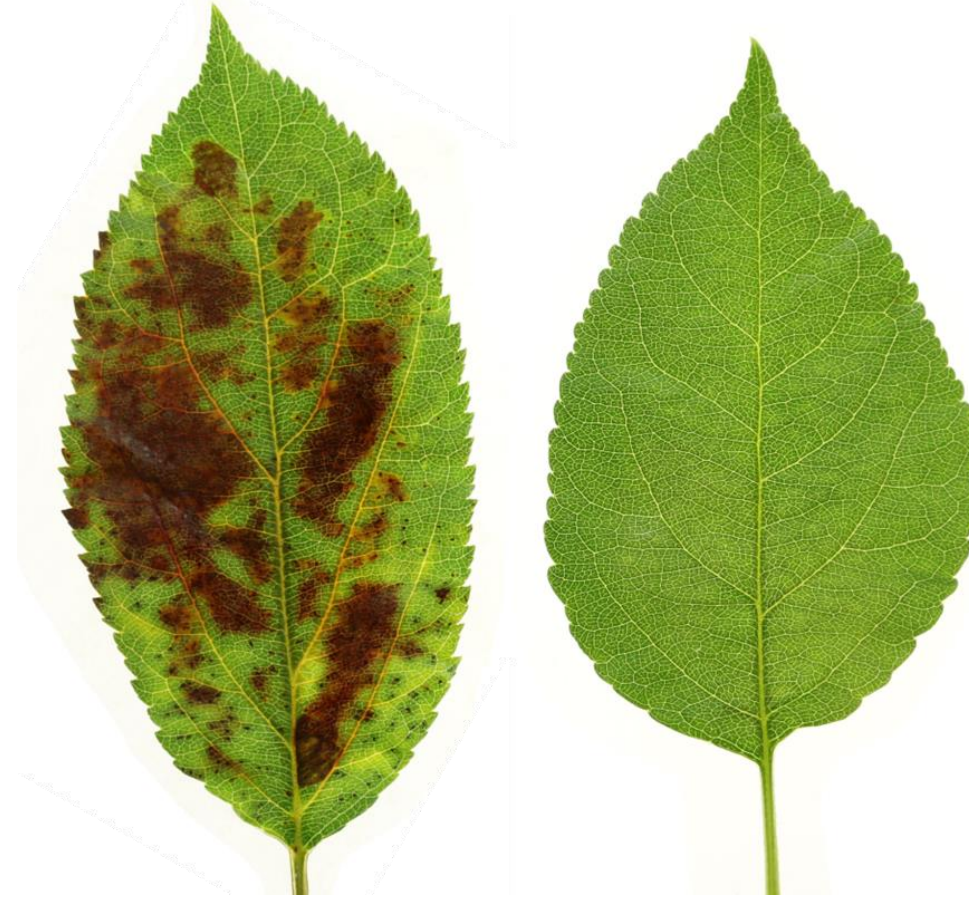
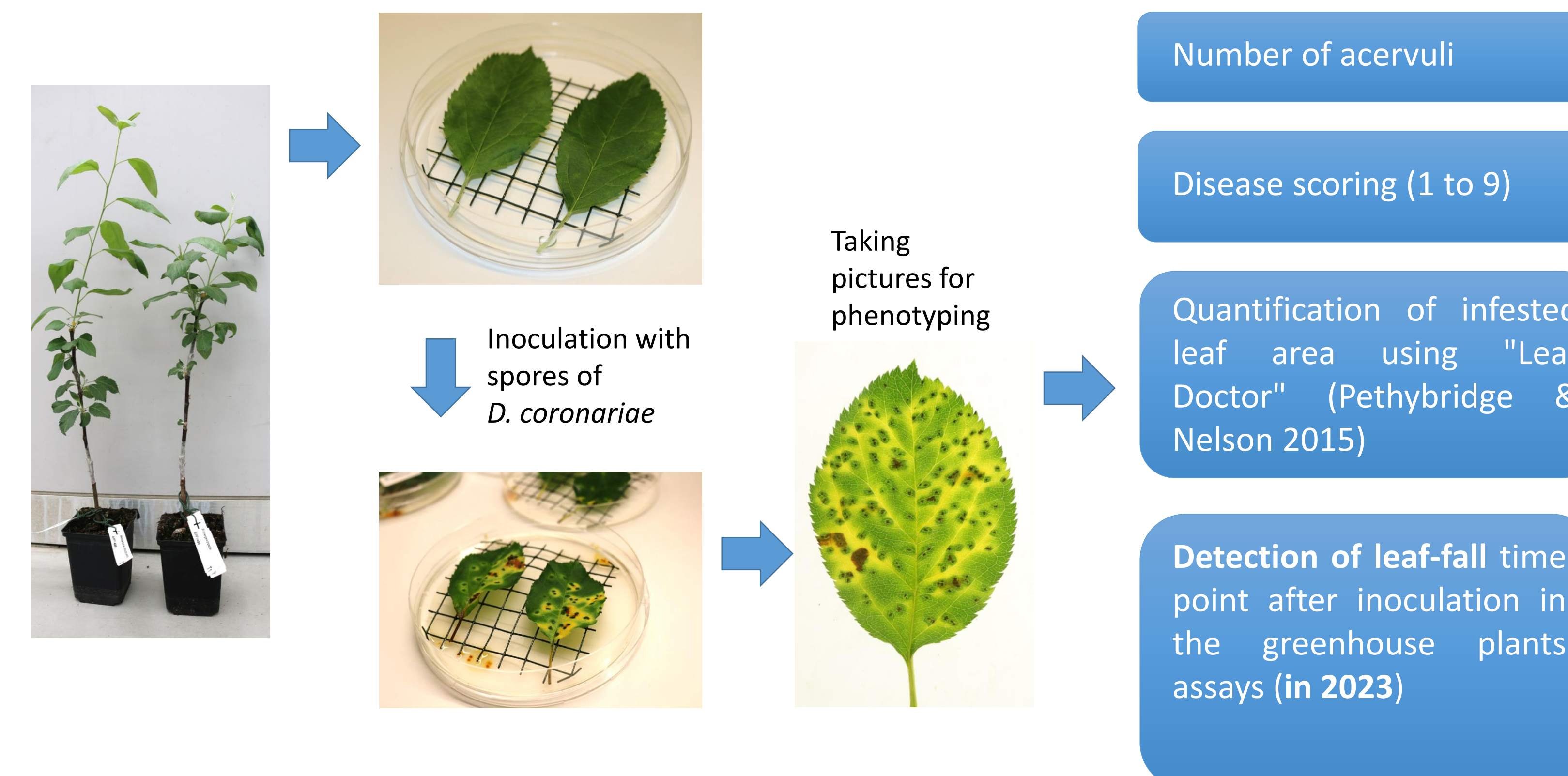


Fig. 1: Infected leaves with *D. coronariae* 13 dpi. Left: Susceptible control 'Golden Delicious'. Right: Robust cultivar 'Uphuser Tietjenapfel'

Material and methods

- **Detached-leaf assay** with leaves obtained from grafted plants in the greenhouse in different sets (1-6)
- **100 cultivars** will be tested in each set with susceptible control 'Golden Delicious'
- **Inoculum** was extracted from the surface of infested frozen stored leaves (-20°C)
- Healthy leaves were sprayed with inoculum according to a method of Wöhner *et al.* (2019)
- **Phenotypic characterization** of symptom development at three time points (7, 9, 13 dpi) with the susceptible control '**Golden Delicious**'

Scheme of the procedure:



First results

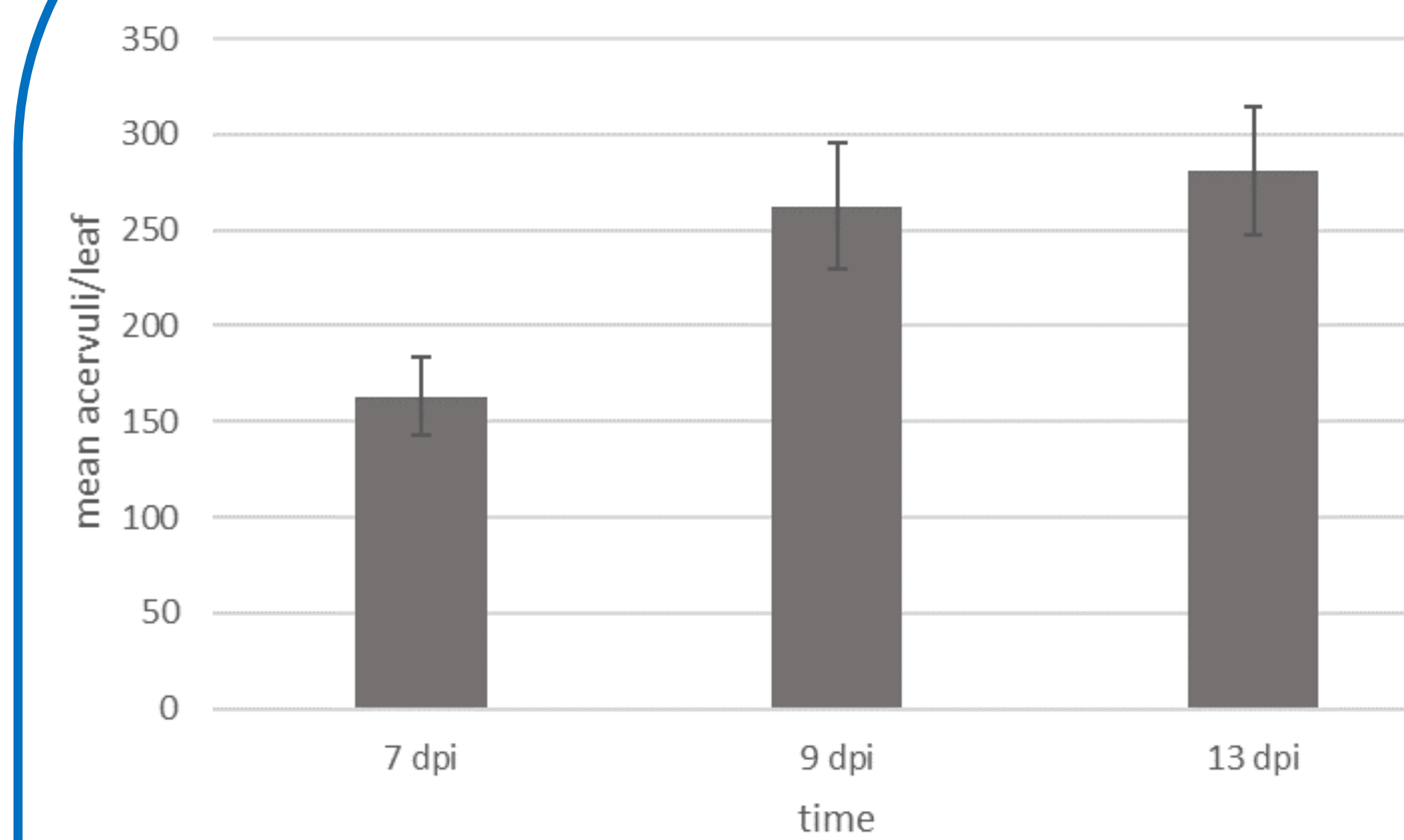


Fig. 2: Mean number of acervuli after 7, 9 and 13 days post inoculation (dpi) for the **susceptible cultivar 'Golden Delicious'** (n=4) obtained from 11 inoculation experiments. (the error bars indicate the standard error)

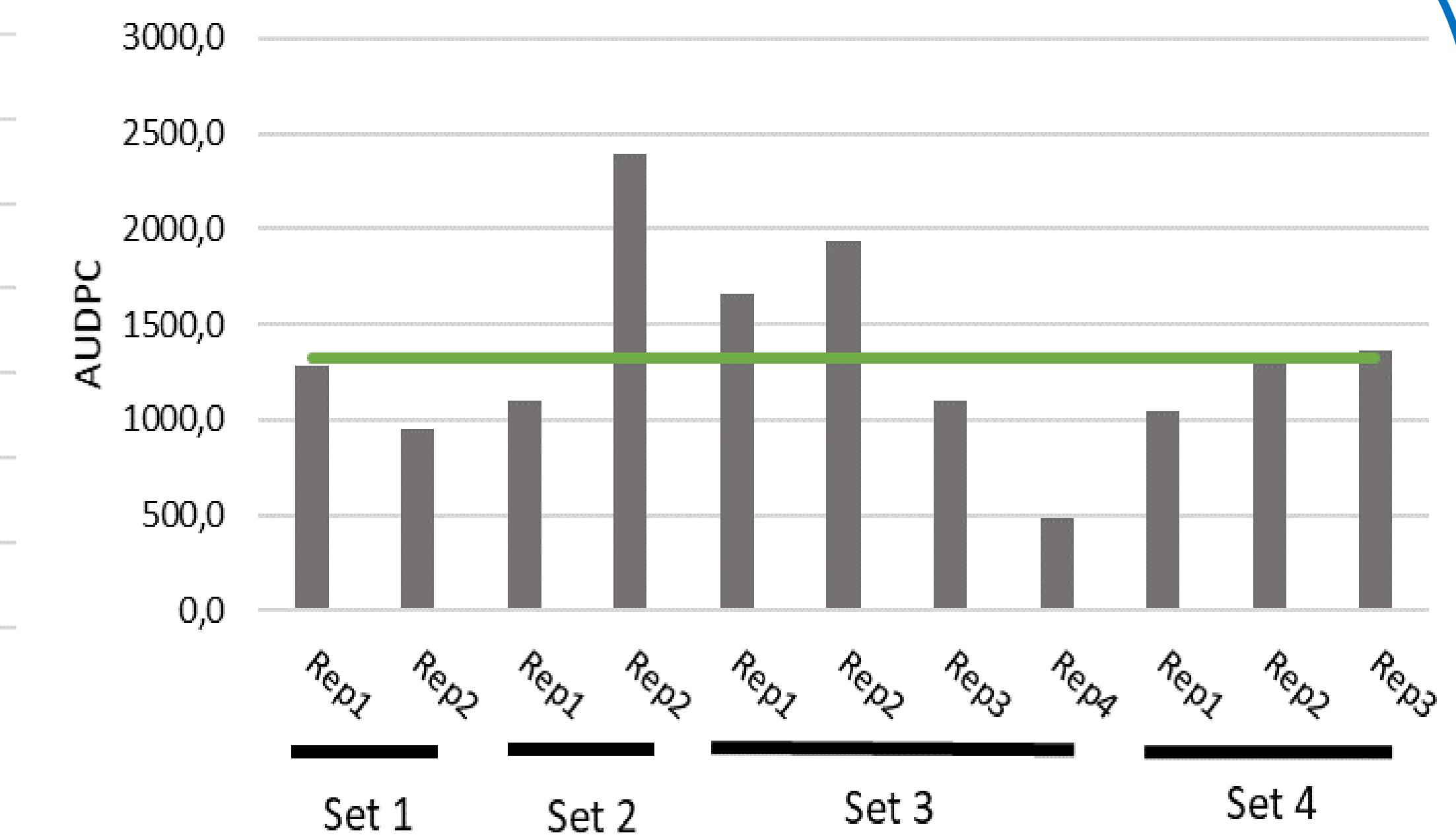


Fig. 3: Investigation of test reproducibility. Acervuli development on 'Golden Delicious' was used to calculate **area under disease progress curve (AUDPC)** from 11 inoculation experiments (Rep). The mean AUDPC is indicated by a green line. AUDPC was calculated using the formula described by Vatter *et al.* (2017).

Conclusion

About **400 cultivars** were tested, up to **575** will be inoculated by the end of 2022. Up to **6000 pictures** will be taken for phenotyping. First results show that **differences in the susceptibility** of apple cultivars exist.

The susceptible control 'Golden Delicious' **showed a high disease expression** within all tested sets (1-4) and replications (Rep). Comparative analysis with cultivars will enable the **identification of resistant or low susceptible cultivars** for further tests.

