

# Testing resistance of apple cultivars to *Marssonina coronaria*

## Introduction

The apple pathogen *Marssonina coronaria* (teleomorph: *Diplocarpon mali*) has recently become a significant problem in Central European organic apple production, causing dark spots on both the leaves and fruit, and early leaf fall.

Field observations and resistance testing under controlled conditions (Yin et al. 2013, Vorley et al. 2014) indicate that there are differences in resistance to *M. coronaria* between cultivars. (Figs. 1 & 2)

## Material and Methods

We screened 39 apple cultivars (Fig. 4), selected from a large collection of genetic resources, for their susceptibility or resistance to *M. coronaria*.

1-year-old saplings were artificially inoculated under semi-controlled conditions.

The development of disease symptoms was observed and assessed several times over more than two months.

## Results and discussion

Symptoms varied largely between cultivars (Fig. 3), from small spots on which acervuli immediately developed to large round brown necrotic spots, often with one acervulus in the centre. Leaf fall often started in the middle of the shoot and in parallel on the lower, older leaves.

Even though important differences in susceptibility were observed (Fig. 4), no cultivar with complete resistance was identified.

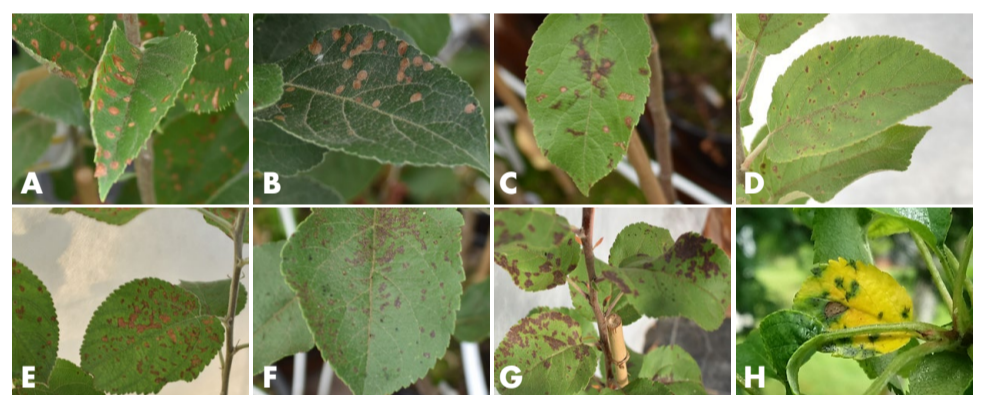
The observations suggest that resistance to the disease is complex, and involves a number of mechanisms.



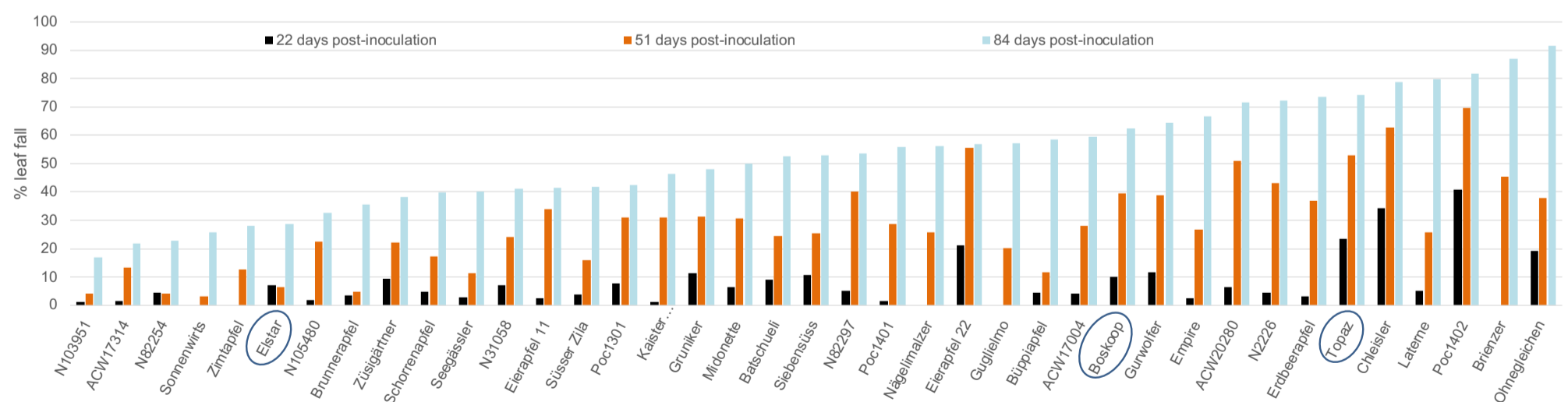
**Fig 1.** Cultivars Schneiderapfel (left) and Rajika (right) under field conditions, Schneiderapfel with healthy leaves and Rajika with advanced defoliation due to infection with *Marssonina coronaria*.



**Fig 2.** Cultivars 'Ohnegleichen', 'Chleisler', 'Elstar' and 'N31058' (from left to right), 70 days after challenge inoculation with conidia of *M. coronaria*, showing different degrees of defoliation due to disease development.



**Fig 3.** Various types of symptom expression and disease development on leaves of different apple cultivars after challenge inoculation with *M. coronaria*. A and B: Blotch-like symptoms with large necrotic areas; C: spread of *M. coronaria* in a leaf, starting from necrotic areas, with abundant formation of acervuli; D: spots with chlorotic halo; E spots with necrotic area and few acervuli; F, G: spot-like symptoms with abundant acervuli and conidia production; H: Rosette leaf with typical *Marssonina* symptoms of net-like spread of the fungus and leaf yellowing.



**Fig 4.** Percentage of *Marssonina* leaf drop for 39 cultivars or accession numbers of apple cultivars at three dates of disease assessment.

## Acknowledgements

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## References

Vorley, T., Oberhänsli T., Tamm L. and Schärer HJ. (2014) Testing susceptibility of apple cultivars against *Marssonina coronaria*. In: Proceedings for the 16<sup>th</sup> International Conference on Organic Fruit-Growing. from February 17<sup>th</sup> to February 19<sup>th</sup>, 2014 at the University of Hohenheim DE.)

Yin, L., Li, M., Ke, X., Li, C., Zou, Y., Liang, D. & Ma, F. (2013). Evaluation of *Malus* germplasm resistance to *Marssonina* apple blotch. *Eur. J. Plant Pathol.*: 136:597-602.