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Phenotyping of resistance to European canker across genetically diverse germplasm

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European canker, caused by the necrotrophic fungus *Neonectria ditissima*, is a serious disease in apple production in countries with cool and wet climate, including Sweden. The disease causes significant economic losses in apple production and may destroy entire trees and even orchards. No effective chemical control measures are currently available and growers remove diseased wood or trees to avoid spreading of the disease, which is labour-consuming.

Resistance to canker is a quantitative trait and no complete resistance to this disease has been found in apple so far. Reliable phenotyping is a crucial step in breeding for resistance, e.g., in choice of parents for crossing and release of promising new cultivars, as well as in research on the genetic dissection of resistance.

Considerable efforts on developing and establishing reliable plant tests has been undertaken at SLU in collaboration with international partners based on controlled and natural inoculations in the greenhouse and in the open using cut shoots as well as young potted trees, natural and artificial wounding, and a series of phenotypic parameters, like Colonization rate (CR), Latent period (LP) and Lesion Growth Rate (LGR). Reproducibility of the results over experiments and years was verified and confirmed.

During this process we have obtained information on the relative resistance on 53 cultivars representing a genetically diverse apple germplasm and also obtained information on cultivar x rootstock interactions. In this presentation we share our main conclusions and lessons learned, and we are looking forward to a vivid discussion on how plant tests might be further improved in accuracy and time and cost efficiency.