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Methods to standardise the severity of Botryosphaeriaceae infections in experimental grapevine plant materials

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Grapevine nursery plants have been reported with latent infections of Botryosphaeria dieback (BD) pathogens. However, it is unclear if the BD infections in nursery plants contribute to the disease incidence observed in vineyards. Recent studies also showed that water-stress can increase the susceptibility of young vines to BD. However, latent infections have no internal or external symptoms and may be randomly distributed within a vine, thus, accurate quantification of the incidence and severity of infection is difficult. Investigations on the effects of water stress on young vines artificially inoculated with three different conidial concentrations of *Neofusicoccum luteum* may provide insight on the infection thresholds that result in disease expression in vineyards. A published inoculation method using a vacuum was evaluated for infiltrating 300 (low), 3,000 (moderate) and 30,000 (high) conidia of *N. luteum* into dormant grapevine canes (cv. Shiraz). Ringers solution was used to vacuum-inoculate control vines. The qPCR analyses showed the vacuum-inoculation was a reliable method, resulting in the pathogen infecting the basal, middle and apical part of the inoculated canes. qPCR analyses also differentiated the low, moderate and high infections with the highest amount of pathogen detected from canes inoculated with 30,000 conidia and the lowest from those inoculated with 300 conidia. No pathogen was detected in any of the canes inoculated with Ringers solution. This study showed that different levels of *N. luteum* conidia can be vacuum-inoculated into dormant canes without significant impact on plant viability. The method was used to standardise infection levels of *N. luteum* in Shiraz rootlings in newly established glasshouse and shade house experiments aimed to investigate the effect of water stress on BD symptom expression.

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Yield losses associated with Barley yellow dwarf virus in wheat and barley

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Barley yellow dwarf virus (BYDV) is one of the most common and important viruses infecting cereal crops in Victoria, often resulting in significant yield losses. It is transmitted by several aphid species such as the bird cherry-oat aphid (*Rhopalosiphum padi*) and the corn aphid (*R. maidis*). A field experiment was conducted in Horsham, Australia to examine yield losses associated with BYDV infection in wheat and barley. The trial consisted of three treatments: early infection, later infection and a non-inoculated control. Randomised replicated plots of wheat and barley were inoculated with BYDV-PAV using viruliferous *R. padi.* Aphids were contained in cages that covered the plants within the plot to prevent contamination of control plots. After virus inoculation, cages were removed and plants were sprayed with insecticide. Before maturity, plants were tested by tissue blot immunoassay to confirm virus presence. Plants were harvested then plant height, biomass, grain yield and grain count were assessed. Virus infection significantly reduced yield of wheat by 80% and barley by 64%.