Grapevine genotypes differ in xylem vessel occlusion after winter pruning

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Abstract:

Context and purpose of the study – Grapevines are continually wounded throughout their cultivation especially during winter pruning. Grapevines respond to wounding by occluding xylem vessels with gels or tyloses to limit pathogen attack and dehydration of the tissues. Although the production of xylem vessel occlusions has been studied in grapevine, to date we have no knowledge of whether different genotypes respond differently. The objective of this study was to characterize the genetic variation in xylem vessel occulsions in five different scion genotypes pruned at different dates.

Material and methods – Canes were pruned on mature grapevines growing in the field in November, January and April (in the Northern hemisphere). The development of xylem vessel occlusions over time was studied after pruning at two different depths from the wound site, 2 and 10 mm. Samples were also taken at pruning and xylem vessel occlusion quantified so that the increase in xylem vessel occlusion was quantified cane-by-cane. Xylem vessel occlusions were quantified manually in 40 µm sections of stem coloured with Toludine blue.

Results - Xylem vessel occlusions differed between different genotypes, generally, xylem vessel occlusions developed more slowly in January than November and April, and the depth at which the xylem vessel occlusion was most extensive differed between different genotypes. The extent of spring time xylem vessel occlusion did not appear to be related to the phenological development (bud break).

Significance of the study – Limited research has been done on the ability of different grapevine genotypes to occlude xylem vessels after pruning. In this study we show that grapevine genotypes differ in their responses to winter pruning, these genotype specific differences could be important during infection by pathogens responsible for grapevine trunk diseases.

Keywords: Grapevine, xylem vessels, gels, tyloses, microscopy, stem, wounding, pruning.