Specific Associations of *Agrobacterium vitis* and grapevines

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Agrobacterium vitis causes crown gall disease on grapevines and with few exceptions is the *Agrobacterium* species associated with grapevines worldwide. Diversity of *A. vitis* has been evaluated by examining differences in Ti plasmids, with emphasis on T-DNA structures, as well as by comparison of chromosomal properties using a range of technologies (2,3). Both tumorigenic and nontumorigenic strains are commonly isolated from *Vitis* spp. and vineyard soils. The bacterium survives systemically in vines and therefore is spread in apparently-healthy cuttings that may be used in propagation. Recently a highly sensitive method for detection of tumorigenic *A. vitis* was developed based on Magnetic Capture Hybridization technology (1). The method, based on detection of a conserved region of *virD2*, is several fold more sensitive than previous methods and has helped to increase our understanding of presence and survival of *A. vitis* in natural environments. In addition to survival in dormant canes of both cultivated and wild grapevines, it was detected in dormant grape buds and on surfaces of grape leaves and shoots.

In addition to causing tumors, both tumorigenic and nontumorigenic strains of *A. vitis* cause a necrosis on grape tissues that impacts grape root development and potentially graft take. The mechanism of necrosis is not fully known but includes quorum-sensing regulation and the involvement of different polyketide and nonribosomal synthases (4).

Inhibition of grape crown gall using biological control has been studied in several laboratories. Nontumorigenic strain F2/5 inhibits strains from infecting grape but not other plant species and does not inhibit growth of the pathogen at inoculation sites. The associated mechanism of grape tumor inhibition shows overlap to that of necrosis but is distinct. Various associated regulatory systems have been identified in addition to the same and different PKS and NRPSs.

(1) Johnson, K. L., Zheng, D., Kaewnum, S. Reid, C. L. and Burr T. J. 2013. Phytopathology 103:633-640.
(2) Kuzmanovic, N. et al. 2015. Euro J. Plant Pathol. 140: 757-768.
(3) Otten, L, et al. 1996 MPMI 9:782-786
(4) Zheng, D., and Burr, T. J. 2016. MPMI 29:109-118.