

Letter to the Editor

Fungal trunk diseases: a problem beyond grapevines?

D. Gramaje^{a*}, K. Baumgartner^b, F. Halleen^{cd}, L. Mostert^d, M. R. Sosnowski^e, J. R. Úrbez-Torres^f and J. Armengol^g

^aInstituto de Ciencias de la Vid y del Vino (Consejo Superior de Investigaciones Científicas, Universidad de La Rioja, Gobierno de La Rioja), Ctra. LO-20 Salida 13, Finca La Grajera, Logroño, 26071, Spain; ^bUnited States Department of Agriculture, Agricultural Research Service, Crops Pathology and Genetics Research Unit, Davis, CA, 95616, USA; ^cPlant Protection Division, Agricultural Research Council Infruitec-Nietvoorbij, Private Bag X5026, Stellenbosch, 7599; ^dDepartment of Plant Pathology, University of Stellenbosch, Private Bag X1, Matieland, 7600, South Africa; ^eSouth Australian Research and Development Institute, Adelaide, SA, 5001, Australia; ^fAgriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, 4200 Highway 97, Box 5000, Summerland, British Columbia, V0H1Z0, Canada; and ^gInstituto Agroforestal Mediterráneo, Universidad Politécnica de Valencia, Camino de Vera s/n, Valencia, 46022, Spain

Dear Editor,

Grapevine trunk diseases (GTDs) are caused by a broad range of taxonomically unrelated fungi that occur wherever grapes are grown and are the main biotic factor limiting vineyard productivity and longevity (Bertsch *et al.*, 2013). GTDs cause untenable economic losses to the grapevine industry worldwide. For example, they are considered a ‘national crisis’ in France, where it has been estimated that 12% of the vineyards are currently economically nonviable due to these maladies causing losses of about €1 billion (Lorch, 2014). Because GTDs are chronic and there is currently no option to eradicate the infections, unproductive vineyards must be replanted, at a worldwide annual cost estimate of €1.132 billion (Hofstetter *et al.*, 2012). The establishment, progress, severity and spread of GTDs have been associated with (i) drought, (ii) limited availability of effective fungicides, (iii) pressure to increase yields, (iv) lack of pruning wound protection due to cost of labour, and/or (v) poor low-quality propagation material.

Growers are demanding solutions. Many vineyards with high GTD incidence were planted in the mid-to-late 1990s, during which wine-grape prices were increasing (Volpe *et al.*, 2008). These vineyards were being replanted in the wake of phylloxera, and nurseries could barely meet the demand for grape plants. In 2009 researchers declared the worldwide impact of GTDs and prioritized research goals (Bertsch *et al.*, 2009). Despite scientific advances, there are still unanswered questions, for example about how the pathogens spread and which climate conditions favour infection. This limits the efficacy of GTD management practices.

Other crops, such as almond, pistachio and walnut, are now experiencing planting booms (INC, 2015). The significance of these and other tree crops is that they host some of the same GTD pathogens. While researchers fine-tune strategies for managing GTDs in grape, the

pathogens may alternate to tree crops, thus endangering the productivity and longevity of orchards and vineyards alike. Recent reports of high disease incidence in pome and stone fruits, nut crops, small fruits and olive in California (Úrbez-Torres *et al.*, 2013), Iran (Mohammadi *et al.*, 2015), Italy (Carlucci *et al.*, 2015), South Africa (Cloete *et al.*, 2011) and Spain (Gramaje *et al.*, 2012) highlight the need for a focus on this new set of hosts. The production systems are different; not all practices for GTD management in grape are feasible in tree crops, especially with dwindling numbers of skilled farm labourers. Tree crop nurseries are struggling to meet demands for plant material and, from our experience with GTDs, a lack of first-quality plants means that low-quality plants are sold, too. Are these plantings doomed to a lifetime of poor productivity? Is the sustainability of the fruit and tree nut industries at risk?

Yours sincerely,

David Gramaje *et al.*

References

- Bertsch C, Larignon P, Farine S, Clément C, Fontaine F, 2009. The spread of grapevine trunk disease. *Science* **324**, 721.
- Bertsch C, Ramírez-Suero M, Magnin-Robert M *et al.*, 2013. Grapevine trunk diseases: complex and still poorly understood. *Plant Pathology* **62**, 243–65.
- Carlucci A, Lops F, Cibelli F, Raimondo ML, 2015. *Phaeoacremonium* species associated with olive wilt and decline in southern Italy. *European Journal of Plant Pathology* **141**, 717–29.
- Cloete M, Fourie PH, Damm U, Crous PW, Mostert L, 2011. Fungi associated with die-back symptoms of apple and pear trees, a possible inoculum source of grapevine trunk disease pathogens. *Phytopathologia Mediterranea* **50**, S176–90.
- Gramaje D, Agustí-Brisach C, Pérez-Sierra A *et al.*, 2012. Fungal trunk pathogens associated with wood decay of almond trees on Mallorca (Spain). *Persoonia* **28**, 1–13.
- Hofstetter V, Buyck B, Croll D, Viret O, Couloux A, Gindro K, 2012. What if esca disease of grapevine were not a fungal disease? *Fungal Diversity* **54**, 51–67.
- INC (International Nut & Dried Fruit Council), 2015. Global statistical review 2014–2015. [<https://www.nutfruit.org/wp-content/uploads/>]

*E-mail: david.gramaje@icvv.es

- 2015/11/global-statistical-review-2014-2015_101779.pdf]. Accessed 24 November 2015.
- Lorch W, 2014. Fatal wood diseases affect 12 percent of French vineyards. [<http://www.wine-searcher.com/m/2014/10/fatal-wood-diseases-affect-12-percent-of-french-vineyards>]. Accessed 28 October 2015.
- Mohammadi H, Sarcheshmehpour M, Mafi E, 2015. Fungal trunk pathogens associated with wood decay of pistachio trees in Iran. *Spanish Journal of Agricultural Research* **13**, e1007.
- Úrbez-Torres JR, Peduto F, Vossen PM, Krueger WH, Gubler WD, 2013. Olive twig and branch dieback: etiology, incidence, and distribution in California. *Plant Disease* **97**, 231–44.
- Volpe R, Green R, Heien D, Howitt R, 2008. *Recent Trends in the California Wine Grape Industry. Agricultural and Resource Economics Update 11 Number 4*. UC Berkeley, CA, USA: Giannini Foundation of Agricultural Economics, 7–10.