Grapevine Grafting Disorders

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Grapevine grafting disorders can pose issues for growers following the planting of a new vineyard.

Grafting is the process of physically connecting two varieties to form a plant that produces the above-ground canopy and crop (cultivars of *Vitis vinifera* L., called scion) and below-ground root system *(Vitis berlandieri, riparia, rupestris*), referred to as the rootstock. The rootstock which will produce the root system must be resistant or tolerant to soil issues such as phylloxera, and abiotic stresses like drought, salinity or calcium (chalk).

The main grafting methods used for the grapevine are:
- Omega graft (mechanized technique used by most nurseries)
- Cleft graft (not in use currently by nurseries but could be mechanised)
- T-bud, chip bud and bark grafts (hand grafting used in the vineyard).

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Successful grafting in plants requires the development of a functional vascular system between the scion and the rootstock (figure 1). Understanding the spatial organisation of the graft interface is important for the evaluation of new rootstock genotypes and for the development of new grafting technologies.

Figures 2 & 3 illustrate longitudinal sections of grafting disorders: Caladoc on SO4 and Shiraz on 110R (omega graft), respectively. The practical issue is that grafting disorders are not always easily spotted by nurseries. Once planted, grapevine mortality can gradually set in resulting in an uneven and less productive vineyard.

Take-home messages :
- The causes of grafting disorders are numerous but generally originate from an unsuccessful grafting process at the nursery. Real grafting incompatibility between scion and rootstock species are less common.
- Unsuccessful grafting unions are not always visually obvious at the nursery or prior to planting. Strong/solid connections between the scion and rootstock don't necessarily mean that the vascular connection has been properly established.
- The quality of the root system matters. Pruned roots are generally prefered because it is easier to plant such grafted vines. Disease free roots will increase the liklihood of survival.

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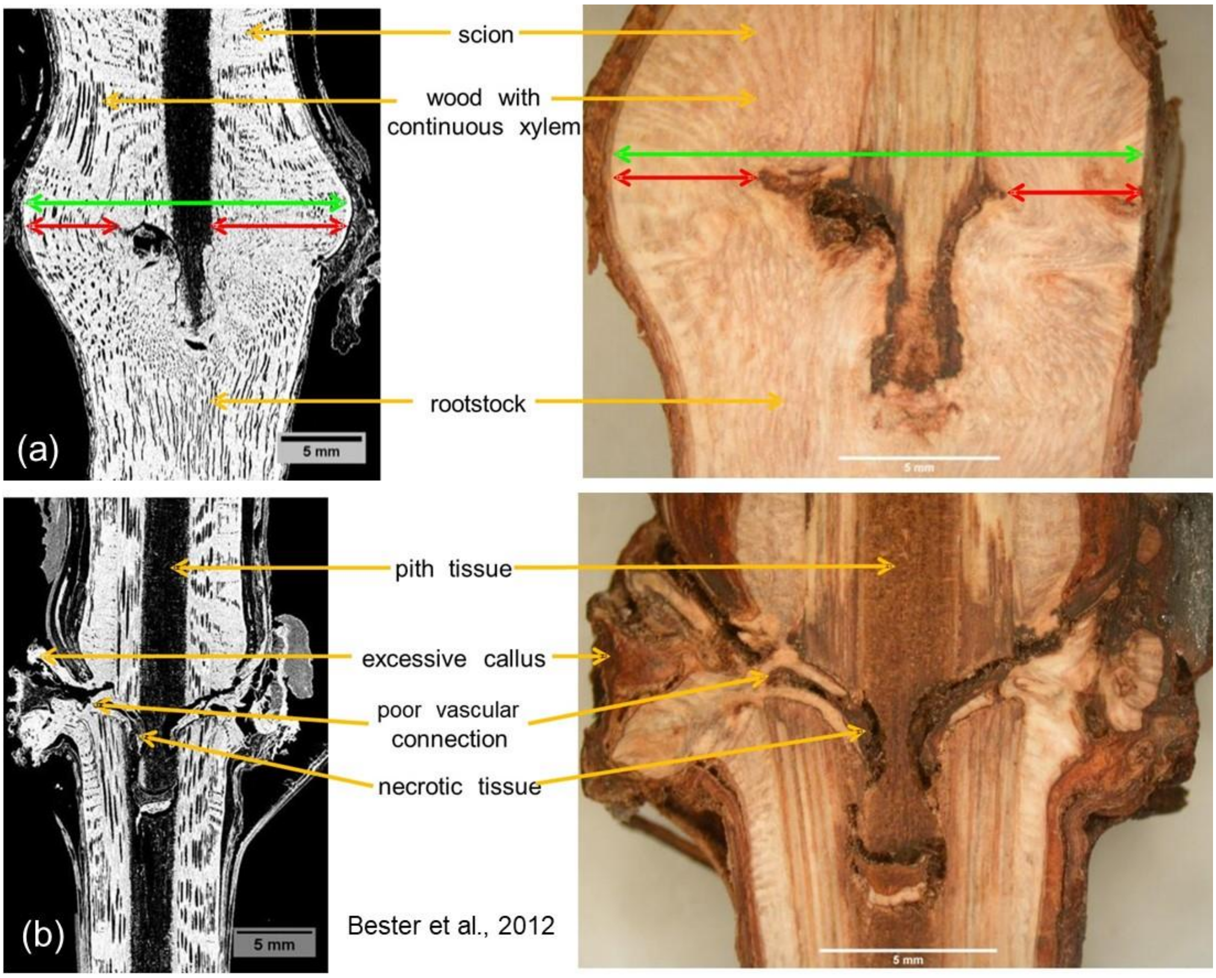

Figure 1: Longitudinal sections and tomography views of Omega graft zones of Pinot gris on 110 Richter: (a) is a healthy plant with good vascular continuality and no grafting disorder symptoms; (b) is a sick plant with poor vascular continuality and classical symptoms of graft incompatibility (from Bester et al., 2012).

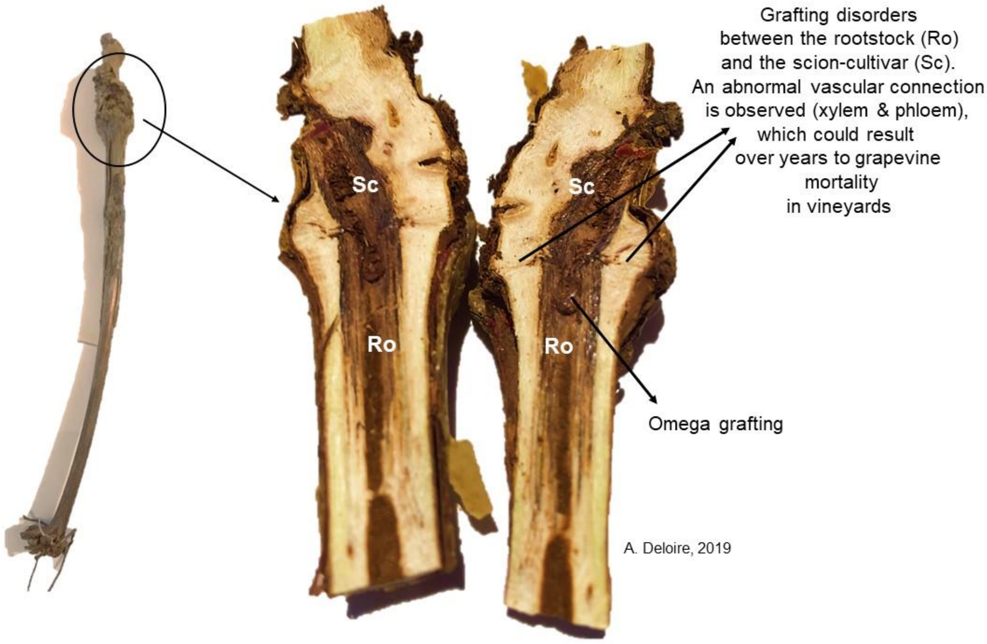

Figure 2: Omega grafting of Caladoc-SO4. Simple longitudinal section shows grafting disorders that could lead to vine mortality over years in vineyards. The grafting disorders are not easy to spot within the nursery.

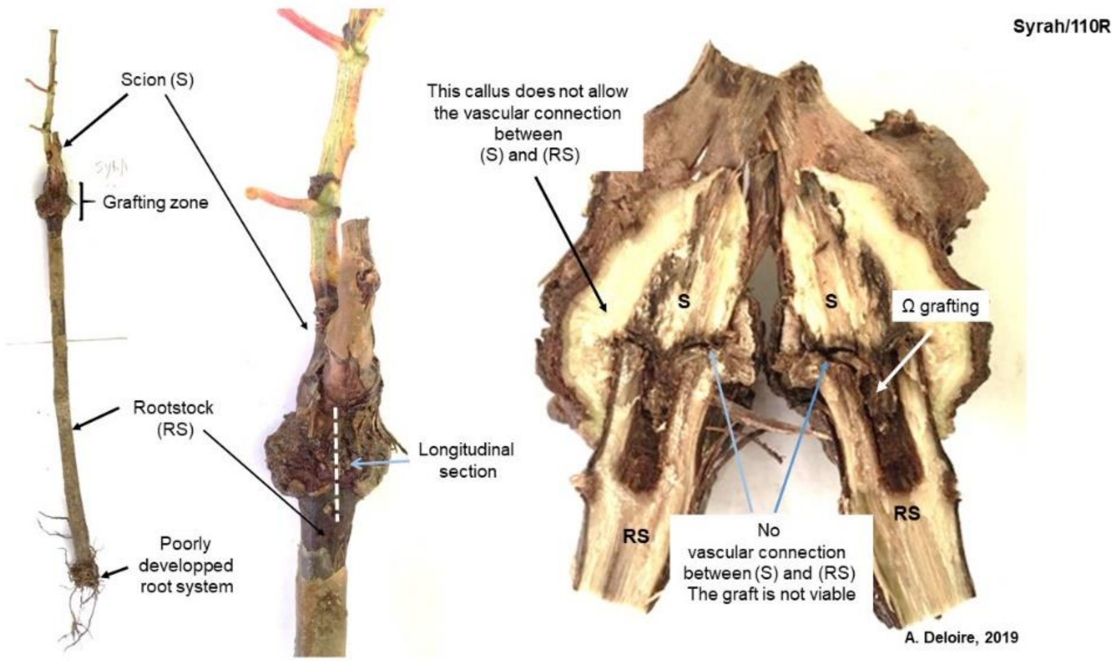

Figure 3: Example of grapevine grafting disorders (Shiraz/110R, omega grafting)