

DISSECTING GRAFT UNION FORMATION IN GRAPEVINE

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Introduction: Grafting is almost mandatory in the European viticulture. Nevertheless, its application is limited by scions/rootstocks incompatibility. We have limited insights on the mechanisms of graft formation and the incompatibility phenomenon. Our goals are to explore grapevine graft incompatibility and the role of RNAs trafficking on the incompatibility phenomenon. The anticipated insights will contribute to the search of alternatives to early predict incompatible partners.

Aims: This work aims to better understand the process of graft union formation in grapevines by determining the time of scions/rootstocks vascular connections and assess transport functionality.

Materials and Methods: *In vitro* micro-homografts have been established and performed to analyze graft formation at 21, 28, 35, 42 and 49 days after grafting (DAG). Graft junctions have been histologically processed, stained and visualized under the microscope. To assess the formation of a continuous and functional vasculature between scion and rootstock the scion's petioles have been incubated in a solution of Propidium Iodide and CFDA dyes. Longitudinal fresh sections of the graft zone have been made and translocation of the dyes was evaluated under a fluorescence microscope.

Results: At 21 DAG callus cells establish a bridge between the grafting partners. At 28 DAG callus cells differentiate in tracheary elements composing vascular bundles crossing the necrotic layer at the graft interface and functionally translocate CFDA. From 28 to 35 DAG the new vascular bundle connects randomly to the pre-existing vasculature.

Conclusion: The characterization of graft formation in grapevine's micro-homografts serves as a basis to compare the effects of different graft combinations with respect to compatibility/incompatibility. *In vitro* micrografting accelerates grafting research and may allow the identification of early cellular signs of compatibility and incompatibility to be used as markers, which both owns widespread implications to improve grapevine propagation.