Scion x rootstock interaction controls grapevine adaptation to drought stress.

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Factors regulating grapevine response to decreasing water availability are presented by both critically summarizing recent studies of the author and using under statistical support published data related to leaf water relationsin an extensive range of scion and rootstock genotypes.

By meta-analyzing stomatal adjustment (gs) to leaf water potential (LWP) decrease upon drought a resulting database containing 718 data points from 26 different *V. vinifera* varieties investigated as scions, 15 non-*V.vinifera* rootstock genotypes and 11 own-rooted *V. vinifera* varieties is presented.

A univariate general linear model (GLM) with factorial design including biological (scion and rootstock genotypes), methodological (instrument-related) and environmental (soil type) fixed factors performed on the whole database explained 82.4% of the variability in data distribution having the rootstock genotype the greatest contribution to variability (19.1%) followed by the scion genotype (16.2%).

A classification of scions and rootstocks according to their mean predicted stomatal conductance in response to moderate water stress has been generated. Results suggest that a *continuum* exists in the range of stomatal sensitivities to water stress in *V. vinifera*, rather than an isohydric- anisohydric dichotomy, that is further enriched by the diversity of scion-rootstock combinations and their interaction with different soil types.

Experimental author’s studies aimed to characterize the influence of rootstock genotypes in the adaptive response of scions to water limiting conditions are presented. Implication on the cell-to-cell aquaporin-controlled component of plant water transport in both rootstock and scion impacts on embolism formation in roots and on hydraulics of leaves. Root-to-shoot abscisic acid signals superimpose on hydraulic limitations.

From the combination of the obtained results, we can interpret the rootstock effect as ‘quantitative’: the ability of roots to supply water relative to shoot transpiration demand displaces reciprocally the gs to LWP response curves to higher/lower parallel positions. On the other hand, the scion effect is ‘qualitative’: the feedback loop between stomatal cenductance and leaf water potential modifies the slope of the curves.

The main conclusion is that rootstock and scion genotypes are able to confer to the plant traits of drought adaptability influencing respectively the capacity of water extraction from the soil and the sensitivity of the stomatal control.

**Key words:** scion, rootstock, water relations, soil type, *Vitis*, water potential, aquaporin, embolism, hydraulic conductance.