



Thesis title: Influence of rootstock on stomatal regulation in grapevine: a meta-analysis

Student name:	Anouk Lavoie-Lamoureux
Institution/company involved:	Univerità degli studi di Torino

Jury members (name/position):

Vittorino Novello/Professor	Luca Rolle/Researcher
Claudio Lovisolo/Associate professor	Kalliopi Rantsiou/Researcher
Antonio Tirelli/External reliance	Silvia Stanchi/Researcher (in replacement of Alessandra Ferrandino)
Luca Cocolin/Associate professor	

Names & emails of supervisors:

Claudio Lovisolo	Claudio.lovisolo@unito.it
Dario Sacco	Dario.sacco@unito.it

Date & location of the oral examination (if known) : July 16th 2014, Asti

Confidential: Yes No

Abstract (max 300 words)

Background: *Vitis vinifera* shows high or low stomatal sensitivities to decreasing leaf water potential (Ψ_{leaf}) among its varieties (near-isohydric versus near-anisohydric, respectively) resulting in different tolerance to drought. Stomatal sensitivity could also be influenced by rootstock genotypes and soil texture.

Objectives: To build a database containing all available values of Ψ_{leaf} or Ψ_{stem} with corresponding stomatal conductance (g_s) and assess the effect of scion, rootstock and soil type on their relationship using a statistical model.

Methods: Over 300 publications were reviewed and data were retrieved using ImageJ Software (NIH) from 47 selected publications. The linearized data were analysed using a general linear model with $\ln(g_s)$ as dependant variable, $\Psi_{\text{leaf/stem}}$ as covariate and all other parameters as fixed factors.

Results: The resulting database contained 971 $\Psi_{\text{leaf/stem}} - g_s$ data from 28 *V. vinifera* varieties and 15 different rootstocks as well as information related to the experimental methods and soil properties among others, when available. A first model performed using the whole $\Psi_{\text{leaf}} - g_s$ dataset described 73.9% of the data variability mainly through scion and rootstock genotypes (combined: 49%). A second model was performed on a restricted dataset containing data from 4 scions, rootstocks grouped according to the presence or absence of *V. rupestris* or *V. riparia* genotypes and soil types classified as water-retaining, -draining or intermediate. This analysis revealed that 27.9% of the 73.9% explained variability was related to the methodology used for measuring stomatal conductance but that rootstock genotype and soil type surpassed scion genotype in explaining the $\Psi_{\text{leaf}} - g_s$ relationship.

Main conclusions: The results of this study performed on data from an extensive number of publications confirm and extend previous studies suggesting that rootstocks having a genotype based on *V. rupestris* decrease stomatal sensitivity to drought compared to *V. riparia* regardless of the scion genotype and that soils with water-retaining properties increase stomatal sensitivity.

Keywords (5): water stress, *Vitis vinifera*, rootstock, soil texture, stomatal sensitivity

Please send a copy of this page to the Vinifera Secretariat, Montpellier, by email in pdf format