Rootstock-scion Interaction in Grape: an Omics perspective (RINGO)

Abstract

The use of grafting for a right rootstock-scion combination was empirically tested and reported for a wide repertoire of *V. vinifera* varieties and rootstock cultivars under various environmental conditions. The rootstock selection improves the vineyards in term of yield quality and quantity contributing greatly to increase the economic businesses for the vine-growers. Nevertheless, no genomics evidences have been reported so far linking the selection of rootstock to scion and rootstock-scion interaction with the molecular mechanisms involved in the determination of the grape/wine quality.

To uncover the molecular bases of the rootstock-scion interaction different “omics” technologies will be applied to specifically designed experimental systems both in controlled and field conditions. The main objective of RINGO project is to identify molecular determinants controlling the interaction, and therefore the rootstock-mediated effects on vine quality. A large “omics” approach will successfully identify additional molecular components whose expression depends on the rootstock-scion interaction.

The main subjects of investigation will be (1) a comparative analysis of signaling components representing the potential important player in rootstock-scion communication, as hormones, other metabolite and microRNAs; (2) the effects of rootstock on crop quality by measuring the central and specialized metabolic component defining the aroma and fragrance of the berry in skin and flesh of developing berries during repining stages; (3) transcriptome variations depending on the rootstock-scion interaction and supporting the metabolomic variations in berries at transcriptomic level by deep sequencing of mRNA and microRNA; (4) understanding of the principal biosynthetic contribution of vegetative and reproductive organs to the total biosynthesis of aroma component; (5) Bioinformatic based integration of all data to achieve a holistic vision (systems biology) of the mechanisms involved in the interactions and of their consequences on grape yield and quality.

The present project will shed light on the role played by rootstock during the key phases of berry ripening, providing further useful elements for the choice of the best rootstock-scion combination in different pedological conditions. The knowledge that will achieved with this project will help to predict the potential of a future combinations and select targets for rootstock modification that can influence scion physiology in a non-transgenic mode.