

EFFECT OF SOIL AIR CAPACITY ON WATER RELATIONS AND VEGETATIVE GROWTH OF THOMPSON SEEDLESS GRAFTED ON DIFFERENT ROOTSTOCKS : PRELIMINARY RESULTS

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INTRODUCTION

Table grapes are grown in a wide range of soil types, thus, often are planted in soils with unfavourable physical conditions for root development. This induce a limited productivity and fruit quality, mainly due to an inappropriate relationship between water and air in the soil. This situation is common in the Aconcagua Valley, Chile (Figure 1) where almost 22% of total Chilean table grapes are cultivated. In this valley the most of the 70% of table grapes orchard are growing in soils with less than 15% of air capacity (AC), Figure 2), lower than the critical value for vine roots growth.

The objective of this study is generate information about the adaptation of Thompson Seedless variety, grafted on six different rootstocks, to soils with different AC.

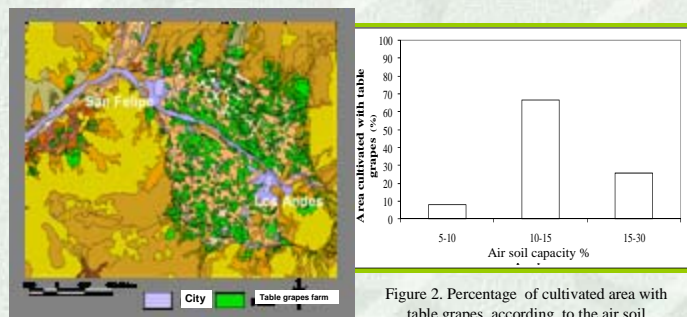


Figure 1. Spatial distribution of table grape farms in Aconcagua Valley

Figure 2. Percentage of cultivated area with table grapes according to the air soil capacity in the Aconcagua Valley

METODOLOGY

The study is been developed in 150 L pots, filled with soils of different textural class (sandy, sandy loam, clay loam and silty loam) to create different AC. The trial includes Thompson Seedless variety grafted on five different rootstocks (110 Richter, Harmony, Freedom, Salt Creek, 1616 Couderc) and a control (Thompson S, ungrafted), planted on 2007/08 season. Physical properties of soils (AC, oxygen diffusion rate), stomatal conductance and prune weight were recorded to unveil the behaviour of vines under different soil air conditions.



RESULTS AND DISCUSSION

Preliminary results of season 2008/09 are presented. Recorded AC of the soils were 26.0%, 14.6%, 10.6% and 9.3%, for sandy, sandy loam, clay loam and silty loam soil, respectively, with oxygen diffusion rates (ODR) ranging between 0.68 and 0.28 $\mu\text{g cm}^{-2} \text{min}^{-1}$ (Figure 3). Stomatal conductance of Thompson Seedless decreased while the AC of soils decreased, (Figure 4). Ungrafted Thompson S. showed lower midday stem water potentials, compared to grafted vines. Although, the best air condition was found on sandy loam soil, no differences were found on pruning weight on grafted vines.

Soil air restrictions caused a significant detriment of pruning weight only on ungrafted Thompson vines (Figure 5). In soils with low AC, Thompson grafted on Richter 110, Salt Creek and Freedom showed the highest growth (Figure 6), while in soils with high AC ungrafted Thompson vines reached the highest growth. (Figure 7)

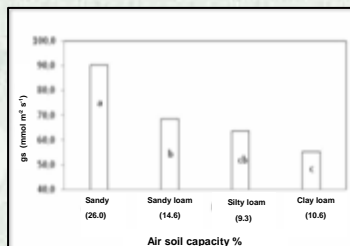
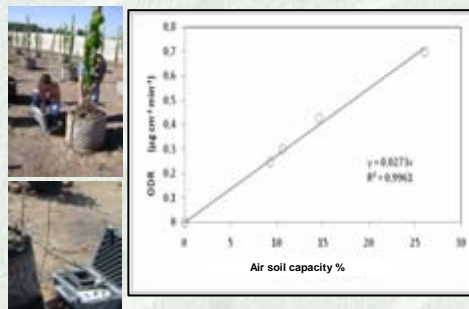


Figure 4. Relationship between the air capacity of soil and stomatal conductance.

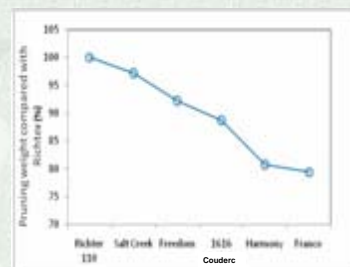


Figure 6. Behavior rootstock in soil of low air capacity

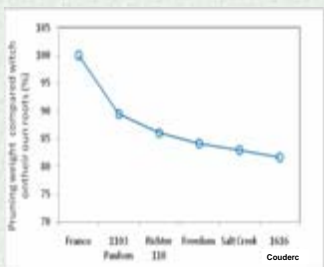


Figure 7. Behavior rootstock in soil of high air capacity

CONCLUSION

Preliminary results indicate that grafting in Thompsons seedless vines should be an important practice to consider in soil with low air capacity, however in soil with high AC ungrafted plants could be used.