

Foreword

The 12 papers in this special issue of *Functional Plant Biology* focus on grapevine physiology. Understanding the physiological functions of the grapevine is crucial for further optimization of viticultural production systems where canopy structure, irrigation and nutritional inputs are major influences on vine performance with regard to yield and grape composition. Viticultural practices are increasingly focused on integrated systems for optimization of not only resources but also, most importantly, grape and wine quality. This special issue seeks to bring together a collection of peer-reviewed papers and reviews that highlight the diversity and depth of current grapevine plant physiology research.

The content ranges from detailed analyses of peroxidase activity (Ros Barcelo *et al.*) and aquaporin function (Picaud *et al.*) to ion uptake (Storey *et al.*) in vines. These areas are providing exciting new insights into grapevine physiology. New work on the influence of chilling on grapevine growth and assimilation is presented by Hendrickson *et al.* Gibberd *et al.* have used grafted grapevines as a model system to largely separate the osmotic and toxic ion influences of saline irrigation to examine the role of salinity on grapevine transpiration efficiency and leaf gas exchange. Partial rootzone drying has the potential to result in large savings of irrigation water and the effect of partial rootzone drying on leaf gas exchange (de Souza *et al.*) and vine growth and fruit

quality (dos Santos *et al.*) are reported. Likewise water deficits, either deliberately applied or inherent in the growing environment, are often characteristic of viticultural production and an analysis of 10 years of field data are presented by Medrano *et al.* Schulz provides a useful link between leaf based measures and canopy scale models of assimilation which, taken together with the report on whole-vine gas exchange (Petrie *et al.*) and measured or modelled values of whole-vine transpiration and canopy conductance (Lebon *et al.* and Lu *et al.*), provide a useful resource for researchers interested in optimizing or modelling grapevine canopy performance. Insights into the genetic control of grapevine flowering (Boss *et al.*) set the scene for future manipulations of, or greater consistency in, vine crop load and potentially also grape and wine quality.

We do hope you find this collection of papers an interesting and useful reference.



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