Grapevine in a Changing Environment

A Molecular and Ecophysiological Perspective

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Grapevine In A Changing Environment A Molecular And Ecophysiological Perspective:

Grapevine in a Changing Environment Hernâni Gerós,Maria Manuela Chaves,Hipolito Medrano Gil,Serge Delrot,2015-10-05 Grapes Vitis spp are economically the most important fruit species in the world Over the last decades many scientific advances have led to understand more deeply key physiological biochemical and molecular aspects of grape berry maturation However our knowledge on how grapevines respond to environmental stimuli and deal with biotic and abiotic stresses is still fragmented Thus this area of research is wide open for new scientific and technological advancements Particularly in the context of climate change viticulture will have to adapt to higher temperatures light intensity and atmospheric CO2 concentration while water availability is expected to decrease in many viticultural regions which poses new challenges to scientists and producers With Grapevine in a Changing Environment readers will benefit from a comprehensive and updated coverage on the intricate grapevine defense mechanisms against biotic and abiotic stress and on the new generation techniques that may be ultimately used to implement appropriate strategies aimed at the production and selection of more adapted genotypes The book also provides valuable references in this research area and original data from several laboratories worldwide Written by 63 international experts on grapevine ecophysiology biochemistry and molecular biology the book is a reference for a wide audience with different backgrounds from plant physiologists biochemists and graduate and post graduate students to viticulturists and enologists **Environmental Information Systems: Concepts, Methodologies, Tools, and Applications** Management Association, Information Resources,2018-09-07 This three volume publication is an IGI Global Core Reference for 2019 as it provides over 75 chapters containing the latest research on information systems remote sensing and geographic information science that is utilized for the management of environmental data Bringing together the international perspectives of researchers in the U S Australia China Canada Italy and more this title is an ideal reference for engineers data scientists practitioners academicians and researchers interested solving conceptual methodological technical and managerial issues within Environmental Information Systems Environmental Information Systems Concepts Methodologies Tools and Applications is an innovative reference source containing the latest research on the use of information systems to track and organize environmental data for use in an overall environmental management system Highlighting a range of topics such as environmental analysis remote sensing and geographic information science this multi volume book is designed for engineers data scientists practitioners academicians and researchers interested in all aspects of environmental information systems *Secondary Metabolites in Grapevine Stress Response - Women in Plant Science Series* Alessandra Ferrandino,Chiara Pagliarani,Eva Pilar Pérez-Álvarez,2023-10-13 Viticulture and Winemaking under Climate Change Helder Fraga,2019-12-19 The importance of viticulture and the winemaking socio economic sector is acknowledged worldwide The most renowned winemaking regions show very specific environmental characteristics where climate usually plays a central role Considering the strong influence

of weather and climatic factors on grapevine yields and berry quality attributes climate change may indeed significantly impact this crop Recent trends already point to a pronounced increase in growing season mean temperatures as well as changes in precipitation regimes which have been influencing wine typicity across some of the most renowned winemaking regions worldwide Moreover several climate scenarios give evidence of enhanced stress conditions for grapevine growth until the end of the century Although grapevines have high resilience the clear evidence for significant climate change in the upcoming decades urges adaptation and mitigation measures to be taken by sector stakeholders To provide hints on the abovementioned issues we have edited a Special Issue entitled Viticulture and Winemaking under Climate Change Contributions from different fields were considered including crop and climate modeling and potential adaptation measures against these threats The current Special Issue allows for the expansion of scientific knowledge in these particular fields of research as well as providing a path for future research **Genomic Designing of Climate-Smart Fruit Crops** Chittaranjan Kole,2020-03-30 This edited book provides a comprehensive overview of modern strategies in fruit crop breeding in the era of climate change and global warming It demonstrates how advances in plant molecular and genomics assisted breeding can be utilized to produce improved fruit crops with climate smart traits Agriculture is facing a number of challenges in the 21st century as it has to address food nutritional energy and environmental security Future fruit varieties must be adaptive to the varying scenarios of climate change produce higher yields of high quality food feed and fuel and have multiple uses To achieve these goals it is imperative to employ modern tools of molecular breeding genetic engineering and genomics for precise plant breeding to produce designed fruit crop varieties This book is of interest to scientists working in the fields of plant genetics genomics breeding biotechnology and in the disciplines of agronomy and horticulture

Improving Sustainable Viticulture and Winemaking Practices J. Miguel Costa,Sofia Catarino,Jose M.Escalona,Piergiorgio Comuzzo,2022-03-19 Improving Sustainable Practices in Viticulture and Enology provides an up to date view on the major issues concerning the sustainability of the wine supply chain The book describes problems and solutions on the use of inputs e g water energy and emphasizes the roles and limitations of implementing circularity in the sector It identifies some of the most relevant metrics while pinpointing the most critical issues concerning the environmental impacts of wine s supply chain vineyards wineries trading This is a novel reference to help the industry excel in production while improving current environmental practices Professionals in industry academics environmentalists and anyone interested in gaining knowledge in sustainable solutions and practices in viticulture and wine production will find this resource indispensable Suggests and discusses solutions to overcome challenges imposed by adverse climate conditions Presents innovative technologies that have an impact on the efficiency of resources and recycling Includes technological tools for more precise monitoring and management in the wine supply chain **Water Scarcity and Sustainable Agriculture in Semiarid Environment** Ivan Francisco Garcia Tejero,Victor Hugo Duran Zuazo,2018-01-03 Water Scarcity and

Sustainable Agriculture in Semiarid Environment Tools Strategies and Challenges for Woody Crops explores the complex relationship between water scarcity and climate change agricultural water use efficiency crop water stress management and modeling water scarcity in woody crops Understanding these cause and effect relationships and identifying the most appropriate responses are critical for sustainable crop production The book focuses on Mediterranean environments to explain how to determine the most appropriate strategy and implement an effective plan however core concepts are translational to other regions Informative for those working in agricultural water management irrigation and drainage crop physiology and sustainable agriculture Focuses on semi arid crops including olive vine citrus almonds peach nectarine plum subtropical fruits and others Explores crop physiological responses to drought at plant cellular and or molecular levels Presents tool options for assessing crop water status and irrigation scheduling Horticultural Reviews, Volume 46 Ian Warrington,2018-10-09 Horticultural Reviews presents state of the art reviews on topics in horticultural science and technology covering both basic and applied research Topics covered include the horticulture of fruits vegetables nut crops and ornamentals These review articles written by world authorities bridge the gap between the specialized researcher and the broader community of horticultural scientists and teachers **Grape Rootstocks and Related Species** Alireza Rahemi,Jean C. Dodson Peterson,Karl True Lund,2022-06-02 This book covers about 20 grape species that are vitally important in breeding programs and provide information on approximately 150 of the most familiar grape rootstocks in the world Today grape rootstocks play a fundamental role in resistance to biotic and abiotic stresses and adaptation of grapevine to different environmental conditions a factor that has opened commercial grape growing up to regions that might otherwise be overlooked Grape rootstocks can be used for adaptation to a variety of soil conditions including soil texture depth nutrient availability pH salinity lime content water availability drought and water drainage Rootstocks can also be used to shift scion cultivar the timing of various key phenological events and indirectly affects vineyard design There are around 1500 grape rootstocks developed in the world of which around 50 are commonly used as commercial rootstock North American species account for around 30 species and two third of them have already been used for rootstock breeding at one time or another However the most commonly available rootstocks are derived from just three American species V berlandieri V rupestris and V riparia Therefore the most common grape rootstocks have a narrow genetic base and efforts to extend the gene pools for breeding programs by using the other species are of ongoing importance to the industry and scientific community

Resilience of Grapevine to Climate Change: From Plant Physiology to Adaptation Strategies Chiara Pastore,Chris Winefield,Maria Paz Diago,Tommaso Frioni,2022-09-20 Nanotechnology Advancement in Agro-Food Industry Ragini Singh,Santosh Kumar,2023-08-24 This book provides a comprehensive insight into the growth of nanotechnology in the agri food industry Currently nanotechnology serves as the most promising means to resolve the issues encountered in the food sector as it enables the production of high quality food with exceptional characteristics such as extended shelf life flavor

freshness and high nutritional content This book focuses on the applications of nanotechnology in various fields such as smart packaging processing and preservation of food It also emphasizes the role of nanomaterials in strategic design of nutraceuticals and functional foods Along with providing an overview of the innovations and application this book also describes future perspectives and offers insights to ensure consumer confidence in terms of safe use In this context the application of nanomaterials as nanosensors is additional covered The book provides readers with a deep knowledge regarding nanomaterials based biosensors colorimetric electrochemical fiber based for detection of pathogens in contaminated food Factors affecting risk assessment regulations and safety concerns regarding the use of nanomaterials in food industry have also been discussed in detail Given its scope this book appeals to a wider readership especially for researchers and students who work in food agronomy and nanomaterials and nanotechnology related fields Natural Sources, Physicochemical Characterization and Applications Constantin Apetrei,2016-11-30 This volume presents different aspects related to bioactive compounds starting with their natural state in raw sources physicochemical characterization and employment in pharmacy and medicine The volume is divided into three parts The first part describes the chemicals structure of bioactive compounds from different natural sources such as olive oils wines and medicinal plants Special attention has been given to identifying the bioactive composition within variations of these natural sources for example extra virgin ordinary or lampante olive oils The second part of the volume presents the principal methods used for detecting identifying and quantifying bioactive compounds Emphasis is given to the use of different types of sensors or biosensors and multisensor systems in combination with analytical techniques The final part explains the principal methods for protection of bioactive compounds and the implication of bioactive compounds in pharmacy This volume is a useful guide for novice researchers interested in learning research methods to study bioactive compounds Frontiers in Bioactive Compounds brings edited reviews on the analysis and characterization of natural compounds of medicinal interest Each volume covers useful information on a variety of natural sources as well as analytical techniques This series is essential reading for analytical and medicinal chemists as well as professionals involved in natural and pharmaceutical product research and development

Molecular and Metabolic Mechanisms Associated with Fleshy Fruit Quality Ana M. Fortes,Antonio Granell,Mario Pezzotti,Mondher Bouzayen,2017-09-08 Fleshy Fruits are a late acquisition of plant evolution In addition of protecting the seeds these specialized organs unique to plants were developed to promote seed dispersal via the contribution of frugivorous animals Fruit development and ripening is a complex process and understanding the underlying genetic and molecular program is a very active field of research Part of the ripening process is directed to build up quality traits such as color texture and aroma that make the fruit attractive and palatable As fruit consumers humans have developed a time long interaction with fruits which contributed to make the fruit ripening attributes conform our needs and preferences This issue of Frontiers in Plant Science is intended to cover the most recent advances in our understanding of different aspects of fleshy

fruit biology including the genetic molecular and metabolic mechanisms associated to each of the fruit quality traits It is also of prime importance to consider the effects of environmental cues cultural practices and postharvest methods and to decipher the mechanism by which they impact fruit quality traits Most of our knowledge of fleshy fruit development ripening and quality traits comes from work done in a reduced number of species that are not only of economic importance but can also benefit from a number of genetic and genomic tools available to their specific research communities For instance working with tomato and grape offers several advantages since the genome sequences of these two fleshy fruit species have been deciphered and a wide range of biological and genetic resources have been developed Ripening mutants are available for tomato which constitutes the main model system for fruit functional genomics In addition tomato is used as a reference species for climacteric fruit which ripening is controlled by the phytohormone ethylene Likewise grape is a reference species for non climacteric fruit even though no single master switches controlling ripening initiation have been uncovered yet In the last period the genome sequence of an increased number of fruit crop species became available which creates a suitable situation for research communities around crops to get organized and information to be shared through public repositories On the other hand the availability of genome wide expression profiling technologies has enabled an easier study of global transcriptional changes in fruit species where the sequenced genome is not yet available In this issue authors will present recent progress including original data as well as authoritative reviews on our understanding of fleshy fruit biology focusing on tomato and grape as model species **Genomic Designing for Abiotic Stress Resistant Fruit Crops** Chittaranjan Kole,2022-09-20 This book presents deliberations on molecular and genomic mechanisms underlying the interactions of crop plants to the abiotic stresses caused by heat cold drought flooding submergence salinity acidity etc important to develop resistant crop varieties Knowledge on the advanced genetic and genomic crop improvement strategies including molecular breeding transgenics genomic assisted breeding and the recently emerging genome editing for developing resistant varieties in fruit crops is imperative for addressing FHNEE food health nutrition energy and environment security Whole genome sequencing in many of these crops followed by genotyping by sequencing has provided precise information regarding the genes conferring resistance useful for gene discovery allele mining and shuttle breeding which in turn opened up the scope for designing crop genomes with resistance to abiotic stresses The seven chapters each dedicated to a fruit crop and a fruit crop group in this volume elucidate different types of abiotic stresses and their effects on and interaction with the crops enumerate the available genetic diversity with regard to abiotic stress resistance among available cultivars illuminate the potential gene pools for utilization in interspecific gene transfer present brief on classical genetics of stress resistance and traditional breeding for transferring them to their cultivated counterparts depict the success stories of genetic engineering for developing abiotic stress resistant crop varieties discuss on molecular mapping of genes and QTLs underlying stress resistance and their marker assisted introgression into elite varieties enunciate different genomics aided techniques

including genomic selection allele mining gene discovery and gene pyramiding for developing adaptive crop varieties with higher quantity and quality of yields and also elaborate some case studies on genome editing focusing on specific genes for generating abiotic stress resistant crops Ome-wide Studies of Grapevine Fruit Composition and Responses to Agro-environmental Factors in the Era of Systems Biology José Tomás Matus,Simone Diego Castellarin,Giovanni Battista Tornielli,2019-12-06 Fruits play a substantial role in the human diet as a source of vitamins minerals dietary fiber and a wide range of molecules relevant to health promotion and disease prevention The characterization of genes involved in the accumulation of these molecules during fruit development and ripening and in the overall plant s response to the environment constitutes a fundamental step for improving yield and quality related traits and for predicting this crop s behavior in the field This is certainly the case for grapevine Vitis vinifera L one of the most largely cultivated fruit crops in the world The cultivation of this species is facing challenging scenarios driven by climate change including increases in atmospheric carbon dioxide CO2 solar radiation and earth surface temperature and decreases of water and nutrient availability All these events will potentially affect the grapevine phenology physiology and metabolism in many growing regions and ultimately affect the quality of their fruits and of the most important derived product the wine The sequencing of the grapevine genome has given rise to a new era characterized by the generation of large scale data that requires complex computational analyses Numerous transcriptomic and metabolomic studies have been performed in the past fifteen years providing insights into the gene circuits that control the accumulation of all sorts of metabolites in grapevines From now on the integration of two or more omics will allow depicting gene transcript metabolite networks from a more holistic i e systems perspective This eBook attempts to support this new direction by gathering innovative studies that assess the impact of genotypes the environment and agronomical practices on fruits at the ome scale The works hereby collected are part of a Research Topic covering the use of omics driven strategies to understand how environmental factors and agronomical practices including microclimate modification e g sunlight incidence or temperature water availability and irrigation and postharvest management affect fruit development and composition These studies report well settled transcriptomic and metabolomic methods in addition to newly developed techniques addressing proteome profiles genome methylation landscapes and ionomic signatures some of which attempt to tackle the influence of terroir i e the synergic effect of micro climate soil composition grape genotype and vineyard practices A few reviews and opinions are included that focus on the advantages of applying network theory in grapevine research Studies on vegetative organs in their relation to fruit development and on fruit derived cell cultures are also considered **Abiotic Stresses in Agroecology: A Challenge for Whole Plant Physiology** Mauro Centritto,2017-07-04 Understanding plant responses to abiotic stresses is central to our ability to predict the impact of global change and environmental pollution on the production of food feed and forestry Besides increasing carbon dioxide concentration and rising global temperature increasingly frequent and severe climatic events e g

extended droughts heat waves flooding are expected in the coming decades Additionally pollution e g heavy metals gaseous pollutants such as ozone or sulfur dioxide is an important factor in many regions decreasing plant productivity and product quality This Research topic focuses on stress responses at the level of whole plants addressing biomass related processes development of the root system root respiration fermentation leaf expansion stomatal regulation photosynthetic capacity leaf senescence yield and interactions between organs transport via xylem and phloem long distance signaling and secondary metabolites Comparisons between species and between varieties of the same species are helpful to evaluate the potential for species selection and genetic improvement This research topic is focused on the following abiotic stresses and interactions between them Increased carbon dioxide concentration in ambient air is an important parameter influenced by global change and affects photosynthesis stomatal regulation plant growth and finally yield Elevated temperature both the steady rise in average temperature and extreme events of shorter duration heat waves must be considered in the context of alterations in carbon balance through increased photorespiration decreased Rubisco activation and carboxylation efficiency damage to photosynthetic apparatus as well as loss of water via transpiration and stomatal sensitivity Low temperatures late frosts prolonged cold phases freezing temperature can decrease overwintering survival rates productivity of crop plants and species composition in meadows Water availability More frequent severe and extended drought periods have been predicted by climate change models The timing and duration of a drought period is crucial to determining plant responses particularly if the drought event coincides with an increase in temperature Drought causes stomatal closure decreasing the cooling potential of transpiration and potentially leading to thermal stress as leaf temperature rises Waterlogging may become also more relevant during the next decades and is especially important for seedlings and young plants It is not the presence of water itself that causes the stress but the exclusion of oxygen from the soil which causes a decrease in respiration and an increase in fermentation rates followed by a period of potential oxidative stress as water recedes Salinity high salt concentration in soil influences soil water potential the water status of the plant and hence affects productivity Salt tolerance will become an important trait driven by increased competition for land and the need to exploit marginal lands Understanding plant responses to abiotic stresses is central to our ability to predict the impact of global change and environmental pollution on the production of food feed and forestry Besides increasing carbon dioxide concentration and rising global temperature increasingly frequent and severe climatic events e g extended droughts heat waves flooding are expected in the coming decades Additionally pollution e g heavy metals gaseous pollutants such as ozone or sulfur dioxide is an important factor in many regions decreasing plant productivity and product quality This Research topic focuses on stress responses at the level of whole plants addressing biomass related processes development of the root system root respiration fermentation leaf expansion stomatal regulation photosynthetic capacity leaf senescence yield and interactions between organs transport via xylem and phloem long distance signaling and secondary metabolites Comparisons between species and

between varieties of the same species are helpful to evaluate the potential for species selection and genetic improvement This research topic is focused on the following abiotic stresses and interactions between them Increased carbon dioxide concentration in ambient air is an important parameter influenced by global change and affects photosynthesis stomatal regulation plant growth and finally yield Elevated temperature both the steady rise in average temperature and extreme events of shorter duration heat waves must be considered in the context of alterations in carbon balance through increased photorespiration decreased Rubisco activation and carboxylation efficiency damage to photosynthetic apparatus as well as loss of water via transpiration and stomatal sensitivity Low temperatures late frosts prolonged cold phases freezing temperature can decrease overwintering survival rates productivity of crop plants and species composition in meadows Water availability More frequent severe and extended drought periods have been predicted by climate change models The timing and duration of a drought period is crucial to determining plant responses particularly if the drought event coincides with an increase in temperature Drought causes stomatal closure decreasing the cooling potential of transpiration and potentially leading to thermal stress as leaf temperature rises Waterlogging may become also more relevant during the next decades and is especially important for seedlings and young plants It is not the presence of water itself that causes the stress but the exclusion of oxygen from the soil which causes a decrease in respiration and an increase in fermentation rates followed by a period of potential oxidative stress as water recedes Salinity high salt concentration in soil influences soil water potential the water status of the plant and hence affects productivity Salt tolerance will become an important trait driven by increased competition for land and the need to exploit marginal lands **Advances and Challenges of RNAi Based Technologies for Plants - Volume 2** Bruno Mezzetti,Jeremy Bruton Sweet,Guy Smagghe,Elena Baraldi,Salvatore Arpaia,Antje Dietz-Pfeilstetter,Vera Ventura,2022-08-04 **Mitteilungen Klosterneuburg** ,2023 The Grape Genome Dario Cantu,M. Andrew Walker,2019-11-13 This book describes the current state of international grape genomics with a focus on the latest findings tools and strategies employed in genome sequencing and analysis and genetic mapping of important agronomic traits It also discusses how these are having a direct impact on outcomes for grape breeders and the international grape research community While V vinifera is a model species it is not always appreciated that its cultivation usually requires the use of other Vitis species as rootstocks The book discusses genetic diversity within the Vitis genus the available genetic resources for breeding and the available genomic resources for other Vitis species Grapes Vitis vinifera spp vinifera have been a source of food and wine since their domestication from their wild progenitor Vitis vinifera ssp sylvestris around 8 000 years ago and they are now the world s most valuable horticultural crop In addition to being economically important V vinifera is also a model organism for the study of perennial fruit crops for two reasons Firstly its ability to be transformed and micropropagated via somatic embryogenesis and secondly its relatively small genome size of 500 Mb The economic importance of grapes made V vinifera an obvious early candidate for genomic sequencing and accordingly two

draft genomes were reported in 2007 Remarkably these were the first genomes of any fruiting crop to be sequenced and only the fourth for flowering plants Although riddled with gaps and potentially omitting large regions of repetitive sequences the two genomes have provided valuable insights into grape genomes Cited in over 2 000 articles the genome has served as a reference in more than 3 000 genome wide transcriptional analyses Further recent advances in DNA sequencing and bioinformatics are enabling the assembly of reference grade genome references for more grape genotypes revealing the exceptional extent of structural variation in the species *Terrestrial Photosynthesis in a Changing Environment* Jaume Flexas,Francesco Loreto,Hipólito Medrano,2012-07-19 Understanding how photosynthesis responds to the environment is crucial for improving plant production and maintaining biodiversity in the context of global change Covering all aspects of photosynthesis from basic concepts to methodologies from the organelle to whole ecosystem levels this is an integrated guide to photosynthesis in an environmentally dynamic context Focusing on the ecophysiology of photosynthesis how photosynthesis varies in time and space responds and adapts to environmental conditions and differs among species within an evolutionary context the book features contributions from leaders in the field The approach is interdisciplinary and the topics covered have applications for ecology environmental sciences agronomy forestry and meteorology It also addresses applied fields such as climate change biomass and biofuel production and genetic engineering making a valuable contribution to our understanding of the impacts of climate change on the primary productivity of the globe and on ecosystem stability

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Grapevine In A Changing Environment A Molecular And Ecophysiological Perspective Introduction

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