

## Analysis of the genetic diversity and phylogenetic relationships of *Biscogniauxia mediterranea* isolates associated with cork oak

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**Abstract** *Biscogniauxia mediterranea* is one of the most frequent fungal pathogens involved in cork oak decline in the Mediterranean Basin, causing charcoal canker. In Portugal, this disease is widespread on adult declining trees but nowadays it increasingly affects young trees and exhibits atypical symptoms, leading to the hypothesis that some change in the fungus may have occurred. In order to evaluate the genetic diversity and phylogenetic relationship of *B. mediterranea* associated with cork oak, 102 isolates were obtained from young and adult trees of *Quercus suber* and other host species with different disease expression, from several Mediterranean countries. The collection of isolates was analyzed by individual and multigenic phylogenies using Maximum-Likelihood approach based on nucleotide sequences of the internal transcribed spacers of ribosomal DNA, translation elongation factor 1- $\alpha$  and  $\beta$ -tubulin genes, and by microsatellite-primed PCR profiles. Sequence analyses separated the Mediterranean isolates from those from other regions, while MSP-PCR analysis revealed relevant but unstructured diversity among the Mediterranean isolates under study, making this a

monophyletic but diverse population. Considering the adaptive capacity of the fungus in the Mediterranean-climate ecosystems and the present climatic change scenario, all conditions are gathered to favor aggravation of the disease in cork oak stands.

**Keywords** Charcoal canker · Intraspecific variability · Mediterranean ecosystem · *Quercus suber*

### Introduction

*Biscogniauxia mediterranea* (De Not.) O. Kuntze is a xylobiontic fungus responsible for a necrotic disease on stems and branches of hardwoods, known as charcoal canker. The fungus has a worldwide distribution and occurs in a wide range of hosts in particular on the genus *Quercus*, attacking individuals weakened by environmental stresses such as drought and fire (Vannini *et al.* 1999). This fungus is known to have a latent phase during which it lives asymptotically as an endophyte within the host (Marzaglio *et al.* 2001a). When the tree is subjected to stress it spreads rapidly and a large number of black stromata harboring perithecia erupt simultaneously from the dead bark (Collado *et al.* 2004).

*B. mediterranea* was detected in cork oak (*Quercus suber* L.) in Portugal in 1930 (Climaco 1930). It has a high frequency of occurrence in highly degraded stands focusing systematically on trees in advanced phase of decline or dead and wood material lying on the ground, being thus considered as a secondary pathogen (Santos 2003). Nevertheless, recent observations describe the

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# Analysis Of Genetic Diversity And Phylogenetic

**M K Razdan**



## **Analysis Of Genetic Diversity And Phylogenetic:**

The Citrus Genome Alessandra Gentile,Stefano La Malfa,Ziniu Deng,2020-03-18 This book reviews how the release of the citrus genome facilitates the investigation of ancestral species the study of their complex biological features and the genetic basis of agronomic traits of paramount importance for their sustainable cultivation The first chapters discuss citrus origin and distribution and the economic importance and varietal composition of the cultivated species providing an overview of citrus and related genera genetic resources The book then describes the role of traditional breeding techniques for scion and rootstocks as well as the potential of genomic breeding and innovative protocols for biotechnological approaches The second part provides essential information on the genus Citrus the attributes of pure citrus species genetic admixtures hybrids and citrus relatives and on the horticultural classification of cultivated species varieties and rootstocks The third part then focuses on the different molecular mechanisms covering various aspects of citrus biology including the role of beneficial compounds of citrus fruits In addition it examines the molecular responses of citrus to abiotic stresses and to field and post harvest diseases Providing insights gained in recent years it is a valuable guide for those who are interested in gene discovery comparative genomics molecular breeding and new breeding techniques It is particularly useful for scientists breeders and students at universities and public sector institutes involved in research for the citrus industry

*Analysis of Genetic Variation in Animals* Mahmut Caliskan,2012-02-29 Analysis of Genetic Variation in Animals includes chapters revealing the magnitude of genetic variation existing in animal populations The genetic diversity between and within populations displayed by molecular markers receive extensive interest due to the usefulness of this information in breeding and conservation programs In this concept molecular markers give valuable information The increasing availability of PCR based molecular markers allows the detailed analyses and evaluation of genetic diversity in animals and also the detection of genes influencing economically important traits The purpose of the book is to provide a glimpse into the dynamic process of genetic variation in animals by presenting the thoughts of scientists who are engaged in the generation of new idea and techniques employed for the assessment of genetic diversity often from very different perspectives The book should prove useful to students researchers and experts in the area of conservation biology genetic diversity and molecular biology

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their educational journey [www cybellium com](http://www.cybellium.com)      **HIV-1 Genetic Diversity, Volume II** Kok Keng Tee, Michael M. Thomson, Joris Hemelaar, 2022-11-01      Transgenic Crops V Eng Chong Pua, Michael R. Davey, 2007-08-16 The status of crop biotechnology before 2001 was reviewed in Transgenic Crops I III but recent advances in plant cell and molecular biology have prompted the need for new volumes This volume is devoted to fruit trees and beverage crops It presents the current knowledge of plant biotechnology as an important tool for crop improvement and includes up to date methodologies      **The World of Rhabdoviruses** Z.F. Fu, 2005-08-15 This volume reviews the unique and common features of rhabdoviruses which have a very wide host range and are associated with human diseases and also infect domestic livestock and agricultural plants causing enormous economic loss      *Crop Breeding and Biotechnology* Chander Parkash Malik, Chitra Wadhvani, Bhavneet Kaur, 2009 Biotechnology has revolutionized the concepts in agriculture food industrial feed stocks and health care in the past three decades It has furnished techniques to enhance agricultural productivity raise value added products and health care systems and has ensured better environments Rapid advances in diverse areas of biotechnology have ushered tremendous new tools to affect change in agriculture medicine and cell biology The present volume entitled Crop Breeding and Biotechnology furnishes information on recent advances in Biotechnology Written by leading experts it offers the most comprehensive and up to date information on selected topics most sought after by researchers and students at the graduate and postgraduate level Each chapter discusses the current status The strength of this volume is lavishly used images and extensive literature citation in each chapter Certain to become the standard reference for biotechnologists molecular biologists breeders applied biologists a must for teachers and students engaged in teaching and research in plant physiology plant breeding crop improvement and other aspects of plant sciences the book is the definitive source for those who are keen to remain updated with the recent advances in biotechnology pertinent to crop breeding      *The Sweetpotato Genome* G. Craig Yencho, Bode A. Olukolu, Sachiko Isobe, 2024-09-21 This open access book is a compilation of advances in sweetpotato genomics which have been used to improve our understanding of the evolution of sweetpotato increase our knowledge of crop growth and development and provided critical information required for genomic assisted breeding in sweetpotato Sweetpotato is a critical food staple for millions of people in the developing world that has long been considered an under resourced orphan crop However this perception is changing and significantly more resources have been devoted to the improvement of sweetpotato in both the private and public sectors around the world during the last decade Its twelve chapters review the changing food security and commercial food product landscape of sweetpotato in the developed and developing world global wild and cultivated genome sequencing efforts in sweetpotato the evolution of molecular markers and the development of novel polyploid linkage mapping quantitative trait loci and genomic selection strategies required for gene discovery in this complex crop and the use of these new tool in sweetpotato crop improvement programs around the globe This book is useful to students teachers and scientists in universities research institutes and private companies

### **Diversity Study Based on Quality Traits and RAPD Markers and Investigation of Heterosis in Ethiopian**

**Mustard** Adefris Teklewold, 2005-07-20 Hitherto the cultivation of Ethiopian mustard as source of edible oil is limited to Ethiopia only Although its agricultural potential is beginning to be recognized in some other countries the crop is rather a subject of experimental investigation than of large scale production Its commercial and production acceptance and subsequent spread within Ethiopia and elsewhere seems largely restricted by its low oil and meal quality As an oilseed crop less important elsewhere the crop suffers from lack of research investment to generate basic and applied information needed to improve its productivity and quality Diversity for seed quality traits and random amplified polymorphic DNA RAPD markers among germplasm collection from Ethiopia and other countries are not assessed and documented Genetic information that is essential to improve seed yield and its components is meagre The phenomenon of heterosis that has achieved great success in the other oilseed Brassicas is not investigated so far To address some of the above mentioned information gaps this study comprising a series of laboratory and field experiments was carried out with the following objectives 1 to asses the level of variability for some seed quality traits in segregating progenies 2 to asses the genetic diversity in relation to geographic origin within Ethiopia and out side Ethiopia using RAPD markers 3 to determine the level of heterosis and variation in combining abilities for yield and its components in inbred and population derived F1s 4 to identify pre harvest plant characteristics and yield components related to yield heterosis 5 to estimate genetic parameters of seed yield and its components 6 to empirically test the predictive value of parental divergence as determined by DNA markers phenotypic traits and geographic origin to heterosis and 7 to suggest breeding strategies for utilizing heterosis in Ethiopian mustard *Environmental Health Perspectives* ,1993 Genetic Improvement of Solanaceous Crops, Volume 1

M K Razdan, 2005-01-06 Potato is the most significant non cereal crop Much attention has been paid to this commercially important crop The aim of this volume is to capture the recent advances made in improving potatoes using traditional breeding methods as well as genetic engineering technology The book provides a critical appraisal of the state of the art finding on **Current Technologies in Plant Molecular Breeding** Hee-Jong Koh, Suk-Yoon Kwon, Michael

Thomson, 2015-08-26 Recent progress in biotechnology and genomics has expanded the plant breeders horizon providing a molecular platform on the traditional plant breeding which is now known as plant molecular breeding Although diverse technologies for molecular breeding have been developed and applied individually for plant genetic improvement common use in routine breeding programs seems to be limited probably due to the complexity and incomplete understanding of the technologies This book is intended to provide a guide for researchers or graduate students involved in plant molecular breeding by describing principles and application of recently developed technologies with actual case studies for practical use The nine topics covered in this book include the basics on genetic analysis of agronomic traits methods of detecting QTLs the application of molecular markers genomics assisted breeding including epigenomic issues and genome wide association

studies Identification methods of mutagenized plants actual case studies for the isolation and functional studies of genes the basics of gene transfer in major crops and the procedures for commercialization of GM crops are also described This book would be a valuable reference for plant molecular breeders and a cornerstone for the development of new technologies in plant molecular breeding for the future

*Genetic History of Human Populations Along the Ancient Silk Road* Shaoqing Wen,Horolma Pamjav,Maxat Zhabagin,2024-04-05 The Silk Road a historical network of interlinking trade routes across the Afro Eurasian landmass was of great importance to the transport of peoples goods and ideas between the East and the West Although its main use was for importing silk from China traders moving in the opposite direction carried to Central China jewellery glassware and other exotic goods from the Mediterranean jade from Khotan and horses and furs from the nomads of the Steppe The Silk Road brought together the achievements of the different peoples of Eurasia to advance the Old World as a whole

**Population Genetics and Conservation of Aquatic Species** Shaokui Yi,Yanhe Li,Cong Zeng,Narongrit Muangmai,2023-02-01

**Biodiversity and Crop Improvement** Shabir Hussain Wani,2015-05-31 Plant breeding during its evolution has been utilizing biodiversity for producing better crops Nowadays everyone is concerned about saving the biodiversity Intensive agricultural practices climate change and Industrialization are having a straight impact on biodiversity Use of single new improved varieties of crops for large areas is a big threat for crop biodiversity Modern breeding approaches are also suggesting going back towards the land races and farmer s varieties for gene hunting for resistance to various biotic and abiotic stresses This book includes the description about biodiversity and crop improvement It also addresses the utilization of plant genetic resources and crop wild relatives for crop improvement through application of traditional plant breeding techniques as well as molecular and genomic approaches Through this multi authored book an effort has been made to assimilate the most topical results about biodiversity and crop improvement with contemporary plant breeding approaches Eleven chapters written by leading scientists involved in crop Improvement research worldwide provide sufficient coverage of the major factors impacting utilization of biodiversity for crop improvement

**Accelerated Plant Breeding, Volume 1** Satbir Singh Gosal,Shabir Hussain Wani,2020-05-23 Plant improvement has shifted its focus from yield quality and disease resistance to factors that will enhance commerical export such as early maturity shelf life and better processing quality Conventional plant breeding methods aiming at the improvement of a self pollinating crop such as wheat usually take 10 12 years to develop and release of the new variety During the past 10 years significant advances have been made and accelerated methods have been developed for precision breeding and early release of crop varieties This work summarizes concepts dealing with germplasm enhancement and development of improved varieties based on innovative methodologies that include doubled haploidy marker assisted selection marker assisted background selection genetic mapping genomic selection high throughput genotyping high throughput phenotyping mutation breeding reverse breeding transgenic breeding shuttle breeding speed breeding low cost high throughput field phenotyping etc It is an important

reference with special focus on accelerated development of improved crop varieties

### **Okra: Status, Challenges and**

**Opportunities** Surinder K. Tikoo, Sharan Angadi, Aparna Tiwari, Ramesh Kumar Yadav, B. S. Tomar, Aderibigbe Helen Adeniyi, 2025-02-24 This edited book covers all aspects of Okra and its global status. It includes general characteristics, classification and description of various domains affecting crop improvement such as the latest trends in breeding, genomics and molecular marker development, biotic and abiotic stress, nutritional quality aspects, seed production and the export and market expansion scenario of Okra. *Okra (Abelmoschus esculentus) L. Moench* is an important vegetable crop grown throughout the tropical and subtropical regions of the world. In the last five years, okra has gained recognition as a global crop due to its nutritional values being recognized by consumers. The global seed requirement is expected to reach 6000 MT by 2030, making it a 300 million crop soon. This book compiles extensive knowledge on various aspects of okra such as crop improvement, agronomy, seed production and global market status under the aegis of Foundation for Advanced Training in Plant Breeding (ATPBR). This book is designed for breeders, pathologists, biotechnologists, seed production specialists, market managers, graduate and post graduate students and other stakeholders associated with okra crop improvement or market development from both the public and private sectors. It serves as an excellent guide for crop scientists and students working on okra around the globe, helping to generate ideas for formulating public-private collaborative research for future innovation in the crop.

*Population Genomics: Crop Plants* Om P. Rajora, 2024-06-08 Population genomics has revolutionized several disciplines of biology: genetic resource conservation and management and breeding of crop plants by providing key and novel insights into population, evolutionary, ecological and conservation genetics, ecology, evolution and adaptation and facilitating molecular breeding with an unprecedented power and accuracy. Crop plants have been domesticated from their wild progenitors over several centuries and have undergone severe genetic bottlenecks and selection sweeps. Population genomics research has unraveled novel insights into crop plants' origin, evolution, demographic history, center of diversity, domestication history, genetic, genomic diversity and genetic structure of wild and domesticated populations and species, epigenomic diversity, genetic, genomic basis of domestication syndrome, genomic footprints of domestication, selection and breeding, de-domestication, speciation and admixture, taxonomy, phylogeny, ecology, biotic and abiotic stress tolerance and ecological and climate adaptation. Population genomics has also facilitated the development of pangenomes, conservation and management of genetic diversity including in the pre-breeding and breeding programs and genomics-assisted breeding via identifying genotype-phenotype associations and genomic selection in crop plants. This pioneering book presents the advances made and potential of population genomics in addressing the above crop plants' aspects of basic and applied significance and brings together leading experts in crop plants' population genomics to discuss these topics in major crop plants. Genomic, epigenomic, transcriptomic and plant resources available for population genomics research and challenges, opportunities and future perspectives of crop plants' population genomics are also discussed. **Chapters:** Population Genomics of Yams, Evolution and

Domestication of Dioscorea Species and Population Genomics Along With Quantitative Genetics Provides a More Efficient Valorization of Crop Plant Genetic Diversity in Breeding and Pre breeding Programs are available open access under a Creative Commons Attribution 4.0 International License via link [springer.com](https://www.springer.com) Plant Conservation Biotechnology Dr Erica Benson, Erica Benson, 2002-04-12 Introduces biotechnological techniques which are currently used to conserve horticultural and crop plant germplasm forest tree genetic resources endangered plant species and plant cell culture collections Covers techniques and applications **Biotechnology to Enhance Sugarcane Productivity and Stress Tolerance** Kalpana Sengar, 2018-01-12 Sugarcane is the most important plant source for sugar and alcohol production and is cultivated in more than 80 countries in tropical and subtropical areas However environmental factors negatively influence its yield and jeopardize the prospect to meet the increasing demand for sugar other sugarcane derived by products and bioethanol The development of stress tolerant plants is fundamental for the maintenance and increase of crop yields Biotechnology to Enhance Sugarcane Productivity and Stress Tolerance provides a comprehensive account of both theoretical and practical aspects of sugarcane production It contains extensive coverage of genome mapping and molecular breeding in sugarcane and presents the status of the elucidation and improvement of plant genomes of economic interest Through 14 chapters written by eminent scientists with global influence this book examines various methods for sugarcane improvement through biotechnology The book focuses on genetic and physical mapping positioning cloning and monitoring of desirable genes using biotechnological approaches for high sugarcane productivity and the development of stress tolerance Additional information includes the bioengineering of sugarcane procedures to boost productivity genetics and assessments for resistance to drought and salinity genetics for high yields and various topics of research on sugarcane genetics It serves as a detailed reference source for cane growers sugar and sugarcane technologists students and professors



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