

Genetic and bioclimatic variation in *Solanum pimpinellifolium*

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Abstract *Solanum pimpinellifolium*, due to its close relationship to *S. lycopersicum*, has been a genetic source for many commercially important tomato traits. It is a wild species found in the coastal areas of Peru and Ecuador. In this study, the genetic variation of *S. pimpinellifolium* was studied using the diversity found in 10 microsatellites in 248 plants spread throughout its entire distribution area, including Ecuador, which has been underrepresented in previous studies. Peruvian and Ecuadorian accessions are genetically quite differentiated. A possible cause of these differences could be the non-uniform nature

of the coastal Ecuadorian and Peruvian climates, seeing as an important correlation between genetic differentiation and climate has been found. In addition, Ecuadorian and south Peruvian accessions have a lower genetic diversity and a higher homozygosity due to their higher autogamy, lower population size, and possible colonization bottlenecks. The Galápagos Islands population is an extreme case, with no diversity, likely caused by a recent colonization from the northern continental Ecuadorian region where genetically identical plants have been found.

Keywords Andean · Climate · Colonization · Genetic structure · Microsatellite · *Solanum pimpinellifolium*

Elena Zuriaga and José M. Blanca contributed equally to this work.

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Introduction

Solanum pimpinellifolium L. is a small perennial bush common in the coastal areas of Peru and Ecuador. In central and southern Peru, *S. pimpinellifolium* is restricted to cultivated fields, roadsides and dumping grounds, and its distribution is sparse; but in Ecuador and northern Peru, it is found in dense populations located in undisturbed areas (Rick et al. 1977; Caicedo and Schall 2004). The former name of this species, *Lycopersicon pimpinellifolium* (L.) Mill., has been changed because recent studies, based on molecular data, have classified the genus *Lycopersicon* (Miller

Genetic Variation In Solanum

Chittaranjan Kole



Genetic Variation In Solanum:

Genetic Variability and Fruit Morphological Diversity in the Tomato Germplasm Ramhari Thapa, 2014 Tomato *Solanum lycopersicum* L broadly divided into two varieties *Solanum lycopersicum* var *lycopersicum* domesticated tomato and the weedy *Solanum lycopersicum* var *cerasiforme* cherry tomato is closely related to the wild tomato species *Solanum pimpinellifolium* Studies show presence of a very low genetic diversity among tomato cultivars which is estimated to be lower than 5% of that available in nature With the estimation of such a low level of genetic variability in the germplasm assessment of the extent and nature of the genetic variation in tomatoes would be important for breeding and genetic resource conservation programs I used AFLP data to analyze the genetic variability within the germplasm of *Solanum lycopersicum* var *cerasiforme* 112 accessions and genetic variability along with fruit morphological diversity in the accessions of *Solanum lycopersicum* var *lycopersicum* 219 accessions from different parts of the World Cherry tomato *Solanum lycopersicum* var *cerasiforme* in terms of genetic distance and molecular variance 1% molecular variance was very close to *Solanum lycopersicum* var *lycopersicum* than its wild sister taxa *Solanum pimpinellifolium* 20% molecular variance It also showed more genetic diversity H_j 0.42052-0.48361 than that of *S. l. lycopersicum* H_j 0.26008-0.42017 and among its geographic groups South American accessions had more genetic diversity H_j 0.43703-0.48361 than that of Mesoamerican H_j 0.42052-0.46946 and Caribbean accessions H_j 0.42287 The germplasm of *S. l. lycopersicum* showed presence of more genetic diversity in the accessions from Western South America Caribbean and Mediterranean regions H_j 0.42017 and Mesoamerica H_j 0.41790 the places associated with tomato domestication and subsequent dispersal after domestication Studied tomato germplasm was divided into three genetically distinct clusters K3 and one of the clusters cluster 3 in *S. l. lycopersicum*

Assessment of Genetic Variation in Tomato (*Solanum Lycopersicum* Mill.) Gyanendra Kumar Rai, Deeksha Jamwal, 2016-10-14 **Plant Regeneration and Genetic Variability** Indra Vasil, 2012-12-02 Plant Regeneration and Genetic Variability Genetic Diversity in Plants Mahmut Caliskan, 2012-03-14 Genetic diversity is of fundamental importance in the continuity of a species as it provides the necessary adaptation to the prevailing biotic and abiotic environmental conditions and enables change in the genetic composition to cope with changes in the environment Genetic Diversity in Plants presents chapters revealing the magnitude of genetic variation existing in plant populations The increasing availability of PCR based molecular markers allows the detailed analyses and evaluation of genetic diversity in plants 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 by presenting the thoughts of scientists who are engaged in the generation of new ideas 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 Breaking the myth: Breeding for stress tolerance, grain yield, and quality traits

simultaneously by diversifying the narrow genetic base Karansher Singh Sandhu, Ali Raza, Sunil S. Gangurde, Shabir Hussain Wani, 2023-07-20 **Plant Breeding Abstracts**, 1995 **Genetic Diversity and Crossing Relationships of *Lycopersicon Chilense*** Elaine Brigid Graham, 2005 *Genetics, New Frontiers*, 1984 **X International Symposium on Biological Control of Weeds, Bozeman, Montana, USA, July 4-14, 1999**, 2000 *Achieving sustainable cultivation of tomatoes* Dr A. K. Mattoo, Prof. A. K. Handa, 2017-03-31 Discusses developments in good agricultural practice from crop growth models to improved water and nutrition management Reviews advances in understanding plant physiology and genetic diversity as well as their contribution to improvements in breeding Summarises recent research on diseases and pests as well as their control through developing disease resistant varieties or integrated weed management Bibliography of Agriculture, 1975 Vegetables Chittaranjan Kole, 2007-07-10 Genome Mapping and Molecular Breeding in Plants presents the current status of the elucidation and improvement of plant genomes of economic interest The focus is on genetic and physical mapping positioning cloning monitoring of desirable genes by molecular breeding and the most recent advances in genomics The series comprises seven volumes Cereals and Millets Oilseeds Pulses Sugar and Tuber Crops Fruits and Nuts Vegetables Technical Crops and Forest Trees Vegetables contains reviews in 12 chapters contributed by 31 authors from 10 countries Covered are tomato lettuce radish carrot beet eggplant cucurbits onion garlic and other crops included in Brassica rapa Brassica oleracea capsicums and cucurbits The impressive work that has been done on most of these crops is presented in this volume Genome projects already initiated on vegetable crops particularly on Solanaceae and Brassicaceae species may ignite further interest in other vegetables as well Principles of Plant Genetics and Breeding George Acquaah, 2020-12-14 The revised edition of the bestselling textbook covering both classical and molecular plant breeding Principles of Plant Genetics and Breeding integrates theory and practice to provide an insightful examination of the fundamental principles and advanced techniques of modern plant breeding Combining both classical and molecular tools this comprehensive textbook describes the multidisciplinary strategies used to produce new varieties of crops and plants particularly in response to the increasing demands to of growing populations Illustrated chapters cover a wide range of topics including plant reproductive systems germplasm for breeding molecular breeding the common objectives of plant breeders marketing and societal issues and more Now in its third edition this essential textbook contains extensively revised content that reflects recent advances and current practices Substantial updates have been made to its molecular genetics and breeding sections including discussions of new breeding techniques such as zinc finger nuclease oligonucleotide directed mutagenesis RNA dependent DNA methylation reverse breeding genome editing and others A new table enables efficient comparison of an expanded list of molecular markers including Allozyme RFLPs RAPD SSR ISSR DAMD AFLP SNPs and ESTs Also new and updated Industry Highlights sections provide examples of the practical application of plant breeding methods to real world problems This new edition Organizes topics to reflect the stages of an actual breeding project Incorporates the

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