

# The Plant Family Brassicaceae

Mirza Hasanuzzaman  
Editor

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Biology and Physiological Responses  
to Environmental Stresses

*Editor*

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*This book is dedicated to  
My Sons  
Mirza Arian Zaman  
and  
Mirza Ahyan Zaman*

# Preface

Brassicaceae (formerly, Cruciferae) is among the largest angiosperm families belonging to the order Brassicales. It consists of 12–15 tribes with 338–360 genera and about 3709 species distributed all around the globe in all continents, excluding Antarctica. Among the plant families, Brassicaceae has particular agri-horticultural importance, and diverse uses apart from the basic needs. The family consists of various essential genera that have different economic as well as agronomic uses in exploring the world of knowledge using them as model plants. Thus it implies and covers all possible sources by which a plant can be of a bliss/benefit to humankind. The Brassicaceae family comprises many different edible species such as fodder, oilseed, vegetables, and condiments. Rapeseed and mustard are the most crucial oil crops of this family, which is ranked as the third most vital oil source and contains about 14% of the world's edible vegetable oil. Members of this family also uptake heavy metals and serve as hyper-accumulators in soil polluted with heavy metals. Some species can hyper-accumulate toxic metals/metalloids.

Considering the economic importance and the unique adaptive mechanisms, further research is still needed to understand the response of these plants toward abiotic stresses. This information needs to be translated into improved elite lines that can contribute to achieving food security. The knowledge of the physiological and molecular mechanisms acting on these plants needs to be further extended. In the last decades, a growing body of research has reported an interesting finding on the physiology and stress responses in both Brassicaceae plants. Many research works have also been done to understand their tolerance mechanisms when facing abiotic stresses. Recent advances and developments in molecular and biotechnological tools have contributed to easing and widening this mission. However, most of these results and reports are published sporadically, and there are no comprehensive books dealing with this vital plant family, and their research progresses related to abiotic stress physiology.

*The Plant Family Brassicaceae—Biology and Physiological Responses to Environmental Stresses* combines a group of twenty-three chapters written by expert researchers that organizes the most recent information with up-to-date citations, which will provide comprehensive literature of recent advances on

Brassicaceae plant physiology. This book includes several chapters addressing general and unique aspects and questions of Brassicaceae biology and economic importance, as well as several chapters devoted to the Brassicaceae responses and adaptation to environmental stresses as well as their potential to phytoremediation. This book will be an important source of information both for students and researchers working on biology, physiology, environmental interactions, and biotechnology of Fabaceae and Brassicaceae plants.

I would like to give special thanks to the authors for their outstanding and timely work in producing such excellent chapters. I am highly thankful to Dr. Mei Hann Lee (Senior Editor, Life Science) Springer, Japan, for her prompt responses during the acquisition. I am also grateful to Arulmurugan Venkatasalam, Project Coordinator of this book, and all other editorial staff for their precious help in formatting and incorporating editorial changes in the manuscripts. Special thanks to Dr. Sarvajeet Singh Gill (MD University, India) for his critical review of the initial contents of the book and Dr. Md. Mahabub Alam (Sher-e-Bangla Agricultural University, Bangladesh) for his generous help in formatting the manuscripts. I believe that this book is useful for undergraduate and graduate students, teachers, and researchers, particularly from the field of botany, agriculture, plant physiology, agronomy, environmental sciences, plant breeding, biotechnology, and food sciences.

Dhaka, Bangladesh

Mirza Hasanuzzaman

# Contents

<b>The Plant Family Brassicaceae: Introduction, Biology, And Importance</b> . . . . .	1
Ali Raza, Muhammad Bilal Hafeez, Noreen Zahra, Kanval Shaukat, Shaheena Umbreen, Javaria Tabassum, Sidra Charagh, Rao Sohail Ahmad Khan, and Mirza Hasanuzzaman	
<b>Agricultural, Economic and Societal Importance of Brassicaceae Plants</b> . . . . .	45
Nusrat Jabeen	
<b><i>Arabidopsis thaliana</i>: Model Plant for the Study of Abiotic Stress Responses</b> . . . . .	129
Ali Raza, Sidra Charagh, Nida Sadaqat, and Wanmei Jin	
<b>Newly Revealed Promising Gene Pools of Neglected <i>Brassica</i> Species to Improve Stress-Tolerant Crops</b> . . . . .	181
Mohammad Mafakheri and Mojtaba Kordrostami	
<b>Enhancement of Abiotic Stress Tolerance in <i>Camelina sativa</i>: Conventional Breeding and Biotechnology</b> . . . . .	195
Larysa V. Nishchenko and Mirza Hasanuzzaman	
<b>Brassicaceae Plants Response and Tolerance to Salinity</b> . . . . .	203
Subhankar Mondal and Koushik Chakraborty	
<b>Brassicaceae Plants Response and Tolerance to Drought Stress: Physiological and Molecular Interventions</b> . . . . .	229
Ali Raza, Sidra Charagh, Ali Razzaq, Rida Javed, Rao Sohail Ahmad Khan, and Mirza Hasanuzzaman	
<b>Rapeseed: Biology and Physiological Responses to Drought Stress</b> . . . .	263
Mojtaba Kordrostami and Mohammad Mafakheri	

<b>Responses and Tolerance of Brassicas to High Temperature . . . . .</b>	<b>277</b>
Pushp Sharma	
<b>Brassicaceae Plants Response and Tolerance to Waterlogging and Flood . . . . .</b>	<b>311</b>
Mrinalini Prasad and Rajiv Ranjan	
<b>Brassicaceae Plants Response and Tolerance to Nutrient Deficiencies . . . . .</b>	<b>337</b>
K. S. Karthika, Prabha Susan Philip, and S. Neenu	
<b>Brassicaceae Plants Response and Tolerance to Metal/Metalloid Toxicity . . . . .</b>	<b>363</b>
Shyamashree Roy and Sanchita Mondal	
<b>Toxic Metals/Metalloids Accumulation, Tolerance, and Homeostasis in <i>Brassica</i> Oilseed Species . . . . .</b>	<b>379</b>
Muhammad Mudassir Nazir, Zaid Ulhassan, Muhammad Zeeshan, Sharafat Ali, and Muhammad Bilal Gill	
<b>Phytoremediation of Toxic Metals/Metalloids and Pollutants by Brassicaceae Plants . . . . .</b>	<b>409</b>
Neerja Srivastava	
<b>Molecular and Biotechnological Interventions for Improving Brassicaceae Crops for Abiotic Stress Tolerance . . . . .</b>	<b>437</b>
Pankaj Kumar and Dinesh Kumar Srivastava	
<b>Biotechnological Approach for Enhancing Capability of <i>Brassica oleracea</i> var. <i>italica</i> Against Stresses Under Changing Climate . . . . .</b>	<b>451</b>
Mohammad Mafakheri and Mojtaba Kordrostami	
<b>Genome Editing for the Improvement of Brassicaceae for Abiotic Stress Tolerance . . . . .</b>	<b>473</b>
Syed Uzma Jalil and Mohammad Israil Ansari	
<b>Bioinformatics Studies on the Identification of New Players and Candidate Genes to Improve <i>Brassica</i> Response to Abiotic Stress . . . . .</b>	<b>483</b>
Heba T. Ebeed	
<b>Use of Biostimulants for Improving Abiotic Stress Tolerance in Brassicaceae Plants . . . . .</b>	<b>497</b>
M. H. M. Borhannuddin Bhuyan, Sayed Mohammad Mohsin, Jubayer Al Mahmud, and Mirza Hasanuzzaman	



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Hasanuzzaman is an active member of about 40 professional societies and acting as Publication Secretary of Bangladesh Society of Agronomy. He has been honored by different authorities due to his outstanding performance in different fields like research and education. He received the World Academy of Science (TWAS) Young Scientist Award 2014. He attended and presented 25 papers and posters in national and international conferences in different countries (USA, UK, Germany, Australia, Japan, Austria, Sweden, Russia, etc.).

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