

Brassinosteroids: Plant Growth and Development

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Editors

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 Springer

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Preface

Brassinosteroids are endogenous plant growth-promoting hormones found throughout the plant kingdom that influence cellular expansion and proliferation, and the phenotype of mutant affected in brassinosteroid biosynthesis and signaling clearly shows that these plant steroids are essential regulators of physiological processes including organ elongation, vascular differentiation, male fertility, timing of senescence, and leaf development. Several books covering various aspects of brassinosteroid biology and chemistry appeared in 1991, 1999, 2003, and 2011. However, in the past 7 years, a great deal of progress has been made in understanding specific components of brassinosteroid signal transduction and in clarifying mechanism by which brassinosteroid perception ultimately results in changes in the expression of specific genes associated with different developmental programs. The number of physiological processes known to involve brassinosteroid action has also expanded, and significant experiments quantifying the utility of brassinosteroid application in practical agriculture have been documented. Therefore, it is a need of the hour to gather the information in a book form.

The book is comprised of 16 chapters. Chapter 1 of this book gives a survey of diversity of brassinosteroids in plants. Chapter 2 deals with the currently available data of brassinosteroids in microalgae, which has not been covered in any earlier volume of brassinosteroids. The recent progress in brassinosteroids in cereals is covered in Chap. 3. Chapter 4 summarizes the importance of fluoroxyl and hydroxyl substitutions in brassinosteroids for shooting control and the use of in vitro-grown shoots as test systems. Chapter 5 deals with the role of brassinosteroids in plant response to stress. Physiological action of brassinosteroids which depends on their concentration discussed in a Chap. 6 is solely for the role of brassinosteroids during senescence. Regulation of photosynthesis is discussed in Chap. 7. Chapter 8 deals with the genetic and molecular bases of brassinosteroid metabolism and interactions with other phytohormones. In Chap. 9, transformation of matter and energy in crops under the influence of brassinosteroids is briefly described. Chapter 10 covers the use of transcriptomics and proteomics techniques to study the regulation of brassinosteroids in plants. In Chap. 11, the interplay between antioxidant enzymes and brassinosteroids in the control of plant development and stress tolerance is discussed.

Chapter 12 possesses the information of brassinosteroids in relation to horticultural crops. A current scenario on the role of brassinosteroids in plant defense triggered in response to biotic challenges has been discussed in Chap. 13. Anticancer potential of brassinosteroids is described in Chap. 14. Chapter 15 covers the potential of brassinosteroids in abiotic stress tolerance. Finally, a cross talk of brassinosteroid with other phytohormones is summarized in Chap. 16.

This book is not an encyclopedia of review but includes a selected collection of newly written, integrated, and illustrated chapters describing our knowledge of brassinosteroids. The aim of this book is to tell all about brassinosteroids by the present time. The various chapters incorporate both theoretical and practical aspects and may serve as a baseline information for future researches through which significant developments are possible. It is intended that this book will be useful to the students, teachers, and researchers, both in universities and research institutes especially in relation to biological and agricultural sciences.

With great pleasure, we extend our sincere thanks to all the contributors for their timely response, their excellent and up-to-date contributions, and their consistent support and cooperation. We are thankful to all who has helped us in any way during the preparation of this volume. We are extremely thankful to Springer Nature for the expeditious acceptance of our proposal and completion of the review process. Subsequent cooperation and understanding of their staff are also gratefully acknowledged. We express our sincere thanks to the members of our family for all the support they provided and the neglect and loss they suffered during the preparation of this book.

Finally, we are thankful to the Almighty who provided and guided all the channels to work in cohesion of the idea to the development of the final version of this treatise *Brassinosteroids: Plant Growth and Development* until the successful completion of the job.

Aligarh, India
Al Ain, UAE
Amritsar, India
Bialystok, Poland

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Contents

1	The Brassinosteroids Family – Structural Diversity of Natural Compounds and Their Precursors	1
	Marco Antonio Teixeira Zullo and Andrzej Bajguz	
2	Brassinosteroids in Microalgae: Application for Growth Improvement and Protection Against Abiotic Stresses	45
	Andrzej Bajguz	
3	Brassinosteroids in Cereals – Presence, Physiological Activity and Practical Aspects	59
	Anna Janeczko	
4	The Importance of Fluoro and Hydroxyl Substitutions in Brassinosteroids for Shooting-Control: The Use of <i>In Vitro</i>-Grown Shoots as Test Systems.	89
	Adaucto B. Pereira-Netto	
5	Role of Brassinosteroids in the Plant Response to Drought: Do We Know Anything for Certain?	101
	Dana Hola	
6	Brassinosteroids and Senescence	169
	Serap Sağlam Çağ	
7	Brassinosteroid Mediated Regulation of Photosynthesis in Plants	185
	Husna Siddiqui, Fareen Sami, Mohammad Faizan, Ahmad Faraz, and Shamsul Hayat	
8	Genetic and Molecular Bases of Brassinosteroid Metabolism and Interactions with Other Phytohormones	219
	Damian Gruszka	

9	Transformation of Matter and Energy in Crops Under the Influence of Brassinosteroids	251
	Hadi Waisi, Bogdan Nikolic, and Bojan Jankovic	
10	Brassinosteroid Regulated Physiological Process: An Omics Perspective	297
	Husna Siddiqui, Fareen Sami, H. F. Juan, and Shamsul Hayat	
11	Interplay Between Antioxidant Enzymes and Brassinosteroids in Control of Plant Development and Stress Tolerance	323
	Mohammad Yusuf, Qazi Fariduddin, Tanveer Alam Khan, Mohammad Faizan, and Ahmad Faraz	
12	Brassinosteroids: The Promising Plant Growth Regulators in Horticulture	349
	Barket Ali	
13	A Current Scenario on Role of Brassinosteroids in Plant Defense Triggered in Response to Biotic Challenges	367
	Sukhmeen Kaur Kohli, Shagun Bali, Kanika Khanna, Palak Bakshi, Pooja Sharma, Anket Sharma, Vinod Verma, Puja Ohri, Bilal Ahmad Mir, Rupinder Kaur, and Renu Bhardwaj	
14	Anticancer Potential of Brassinosteroids	389
	Olesya V. Panibrat, Vladimir N. Zhabinskii, and Vladimir A. Khripach	
15	Harnessing the Potential of Brassinosteroids in Abiotic Stress Tolerance in Plants	407
	Navdeep Kaur and Pratap Kumar Pati	
16	Emerging Trends on Crosstalk of BRS with Other Phytohormones	425
	Puja Ohri, Renu Bhardwaj, Ravinderjit Kaur, Shivam Jasrotia, Ripu Daman Parihar, Anjali Khajuria, and Nandni Sharma	

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Prof. Renu Bhardwaj is serving Guru Nanak Dev University for more than 27 years in the research area of Plant Growth Regulations and Stress Physiology and has published more than 250 research papers in the journals of national and international repute. She has been on various administrative positions like Director IQAC and Professor-in-Charge Examinations. She has been awarded INSA Visiting Fellowship, CSIR Visiting Associateship, FNEA Award, and FLS, London. She completed 15 major research projects and guided more than 30 Ph.D. students. She has also organized more than 20 national/international conferences. She has collaborated research both at national and international levels.

Dr. Andrzej Bajguz is Professor in the University of Bialystok, Poland. In 1994, he obtained his M.Sc. degree in Biology at Warsaw University, Branch in Bialystok, his Ph.D. in 1998 at the Nicholas Copernicus University in Torun, and Habilitation in Biological Sciences in 2012. He works at the University of Bialystok. He is an author or a coauthor of 85 original and review papers, chapters, and 6 books. He is a member of the Polish Biochemical Society, the Polish Botanical Society, the Polish Society of Experimental Plant Biology, and the Federation of European Societies of Plant Biology. He is also a member of the editorial board of the *Journal of Plant Growth Regulation* and *Frontiers in Plant Science* and an expert of the National Science Centre in Poland. Fields of his scientific interest are phytohormones, especially brassinosteroids—their physiology and biochemistry in lower plants. Within the last 20 years, the dominant area of his scientific experiments was hormonal growth and development regulation of the algae, mainly through brassinosteroids.

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