Shamsul Hayat · Aqil Ahmad Mohammed Nasser Alyemeni *Editors* 

# Salicylic Acid

Plant Growth and Development



# **Salicylic Acid Plant Growth And Development**

**Tariq Aftab** 

# **Salicylic Acid Plant Growth And Development:**

SALICYLIC ACID - A Plant Hormone Shamsul Hayat, Agil Ahmad, 2007-06-06 Phytohormones are very much involved in directing plant growth in a coordinated fashion in association with metabolism that provides energy and the building blocks to develop the form that we recognize as plant Out of the recognized hormones attention has largely been focused on Auxins Gibberellins Cytokinins Abscisic acid Ethylene and more recently to Brassinosteroids However this book provides information about a natural chemical Salicylic Acid that could be raised to the status of the above phytohormones because it has significant impact on various aspects of plant life Salicylic acid SA was first discovered as a major component in the extracts from Salix willow whose bark from ancient time was used as an anti inflammatory drug This acid SA is a phenol ubiquitous in plants generating a significant impact on plant growth and development photosynthesis transpiration ion uptake and transport and also induces specific changes in leaf anatomy and chloroplast structure SA is recognized as an endogenous signal mediating in plant defence against pathogens This book includes contributions made by various experts spread over the world Salicylic Acid Shamsul Hayat, Aqil Ahmad, Mohammed Nasser Alyemeni, 2013-05-31 In its second edition this book covers Salicylic Acid biosynthesis action in response to water deficit the interplay between environmental signals and SA its impact on transport and distribution of sugars potential uses in food production and much more Versatile Plant Growth Regulator Shamsul Hayat, Husna Siddiqui, Christos A. Damalas, 2022-01-07 Phytohormones are known to affect the growth and development of plant directly as well as indirectly Salicylic acid SA is a phenolic phytohormone which induces systemic resistance in plants and also regulates defence responses The derivatives of SA also play an important role in the regulation of various physiological and developmental processes in plants under normal and stressful environmental conditions SA regulates seed germination photosynthesis ethylene biosynthesis enzyme activities nutrition flowering legume nodulation and overall growth and development of plant Recently advancement in elucidating the specific pathways of SA signal transduction has been noticed which helps in understanding the expression of specific genes associated with different developmental programs The horizon of SA mediated regulation of various physiological processes has also expanded and various studies enumerating the efficacy of exogenously applied SA in practical agriculture have also been documented Therefore information regarding such recent developments needs to be compiled in the form of a book This book aims to provide a collective information regarding SA which makes it a versatile plant growth regulator The chapters included both theoretical and practical aspects that could be of immense use for researches and possible significant developments in future It is intended that this book will be a help for students teachers and researchers in understanding the relation between the phytohormone and agricultural sciences Salicylic Acid: A Multifaceted Hormone Rahat Nazar, Noushina Igbal, Nafees A. Khan, 2017-11-20 This book provides an overview of current knowledge ideas and trends in the field of induced acclimation of plants to environmental challenges Presenting recent advances in our understanding of

the importance of salicylic acid it paves the way for deciphering the precise role of salicylic acid in the field of plant physiology biochemistry and agronomy and breeding stress tolerant and high yielding sustainable transgenic crops Adopting a mechanistic approach the book offers valuable information on the role of salicylic acid in combating varied abiotic stresses Plants are challenged by biotic and abiotic stresses They adjust to changing environmental conditions by adopting various measures to induce regulatory self defense pathways in response to different stresses in order to maintain their genetic potential to optimally grow and reproduce To minimize cellular damage caused by such stresses phytohormones provide a number of signaling networks involving developmental processes and plant responses to environmental stress Phytohormones are potential tools for sustainable agriculture in the future Significant advances have been made in identifying and understanding plant hormone signaling especially salicylic acid **Plant Hormones in Crop Improvement** M. Igbal R Khan, Amarjeet Singh, Peter Poor, 2023-02-13 Plant Hormones in Crop Improvement examines the signaling pathways and mechanisms associated with phytohormones with particular focus on stress resilience. The growing population of world and unpredictable climate puts pressure on the agriculture production Current constraints such as increasing temperatures drought salinity cold nutrient deficiency along with biotic interactions trigger exquisitely tuned responsive mechanisms in plants The main coordinators of all stress related mechanisms are phytohormones which can be transported over long distances and play a significant role in controlling physiological agronomic and growth traits metabolites and sustained crop productivity Therefore understanding the mechanisms influencing the stress responses mediated by phytohormones is crucial to ensure the continuity of agricultural production and food security This book aims to address sustainable agricultural approaches to improve biotic and abiotic stress resilience in crop plants covering different topics from perception and signaling plant hormones to physiological and molecular changes under different cues Plant Hormones in Crop Improvement is an essential read for students researchers and agriculturalists interested in plant physiology plant genetics and crop yield improvement Comprehensive review of phytohormone pathways and mechanisms in relation to stress tolerance Crosstalk between phytohormones and signaling molecules under optimal and stress affiliated responses Omics approaches in plant responses to stress adaptation Plant Phenolics in Biotic Stress Management Rafig Lone, Salim Khan, Abdullah Mohammed Al-Sadi, 2024-02-27 This edited book presents the latest research on the role of plant phenolics in stress management in plants It sheds light on addressing the biotic stress management in plants by plant phenolics under changed environmental conditions In natural systems plants face a plethora of antagonists and thus possess a myriad of defenses and have evolved multiple defense mechanisms by which they can manage the various kinds of stresses for adaptation Plant phenolics being ubiquitous and thus plays important role in adapting the plants to the varied environment This book is of interest and helpful to cover a different topic of regulation of biotic stress in plants Further the book will provide users with a cutting edge review of this field and set the direction for future exploration Bringing together work from

leading international researchers it will be also a valuable reading material for plant and agricultural scientists academics researchers students and teachers wantingto gain insights into the role of plant phenolics in biotic stress management in plants for sustainability It's a comprehensive practical reference that aids researchers in their understanding of the role of plant phenolics in biotic stress tolerance Control of Plant Organ Size and Shape Ran Xu, Shengjun Li, Na Li, Hirokazu Jasmonates and Salicylates Signaling in Plants Tariq Aftab, Mohammad Tsukaya, Yunhai Li, 2022-11-29 Yusuf, 2021-07-15 Demand for agricultural crops and nutritional requirement continues to escalate in response to increasing population Also climate change exerts adverse effects on agriculture crop productivity Plant researchers have therefore focused to identify the scientific approaches that minimize the negative impacts of climate change on agricultural crops Thus it is the need of the hour to expedite the process for improving stress tolerance mechanisms in agricultural crops against various environmental factors in order to fulfil the world's food demand Among the various applied approaches the application of phytohormones has gained significant attention in inducing stress tolerance mechanisms Jasmonates are phytohormones with ubiquitous distribution among plants and generally considered to modulate many physiological events in higher plants such as defence responses flowering and senescence Also jasmonates mediate plant responses to many biotic and abiotic stresses by triggering a transcriptional reprogramming that allows cells to cope with pathogens and stresses Likewise salicylates are important signal molecules for modulating plant responses to environmental stresses Salicylic acid influences a range of diverse processes in plants including seed germination stomatal closure ion uptake and transport membrane permeability and photosynthetic and growth rate Understanding the significant roles of these phytohormones in plant biology and from agriculture point of view the current subject has recently attracted the attention of scientists from across the globe Therefore we bring forth a comprehensive book Jasmonates and Salicylates Signalling in Plants highlighting the various prospects involved in the current scenario The book comprises chapters from diverse areas dealing with biotechnology molecular biology proteomics genomics metabolomics etc We are hopeful that this comprehensive book furnishes the requisite of all those who are working or have interest in this topic Effect of Salicylic acid, Lead and their interaction on growth and development of (Phaseolus vulgaris L.) plants Halala Qader, 2014-10-28 Master s Thesis from the year 2013 in the subject Biology Botany language English abstract This study consisted of four experiments conducted in the greenhouse of Biology Department in the College of Science University of Salahaddin Erbil during 18 4 2012 to 28 7 2012 The first experiment consisted of foliar spray of different concentrations of Salicylic acid 0 50 100 200 and 400ppm the second experiment included the application of different methods of Salicylic acid 250ppm presoaking seeds foliar spray injection and soil application The third experiment consisted of different concentrations of Lead 0 5 10 15 and 20ppm as soil irrigation and the fourth experiment consisted of interaction application of Salicylic acid and Lead on vegetative growth yield and chemical components of common bean The results obtained were analyzed statistically using

Complete Randomized Design C R D for the first three experiments and Factorial Complete Randomized Design Factorial C R D for the fourth experiment with four replications for each treatment Comparison of means were carried out by using Duncan s Multiple Range Test at the probability of 0 05 for vegetative and yield parameters and 0 01 for the chemical constituents

Plant Phenolics in Sustainable Agriculture Rafiq Lone, Razia Shuab, Azra N. Kamili, 2020-08-28 This book presents the latest research on plant phenolics offering readers a detailed yet comprehensive account of their role in sustainable agriculture It covers a diverse range of topics including extraction processes the role of plant phenolics in growth and development plant physiology post harvesting technologies food preservation environmental biotic and abiotic stress as well as nutrition and health Further the book provides readers with an up to date review of this dynamic field and sets the direction for future research Based on the authors extensive experience and written in an engaging style this highly readable book will appeal to scholars from various disciplines Bringing together work from leading international researchers it is also a valuable reference resource for academics researchers students and teachers wanting to gain insights into the role of plant phenolics in sustainable agriculture Managing Plant Production Under Changing Environment Mirza Hasanuzzaman, Golam Jalal Ahammed, Kamrun Nahar, 2022-02-22 This comprehensive edited volume collects the most recent information with up to date citations on the decrease in plant productivity under climatic changes and its link with global food security The book emphasis on the crop management practices and recent advancement in the techniques for mitigating the negative effects of climate induced biotic and abiotic stress It brings together 19 chapters developed by eminent researchers in the area of plant and environmental sciences Global climate change is increasingly becoming a concern for future of agriculture High levels of inorganic and organic pollutants and climatic stress adversely affects the sensitive and complex equation of natural resources and ecosystem services To meet the increased food demand plant productivity needs to be enhanced therefore this book fills in the gap and brings together information on the physiological and molecular approaches for improving crop productivity The book is resourceful reading material for researchers faculty members graduate and post graduate students of plant science agriculture agronomy soil science botany Molecular biology and Environmental Stress Physiology of Plants and Crop Productivity Tajinder Kaur, Saroj environmental science Arora, 2021-05-06 The knowledge of plant responses to various abiotic stresses is crucial to understand their underlying mechanisms as well as the methods to develop new varieties of crops which are better suited to the environment they are grown in Environmental Stress Physiology of Plants and Crop Productivity provides readers a timely update on the knowledge about plant responses to a variety of stresses such as salinity temperature drought oxidative stress and mineral deficiencies Chapters focus on biochemical mechanisms identified in plants crucial to adapting to specific abiotic stressors along with the methods of improving plant tolerance The book also sheds light on plant secondary metabolites such as phenylpropanoids and plant growth regulators in ameliorating the stressful conditions in plants Additional chapters present

an overview of applications of genomics proteomics and metabolomics including CRISPR CAS techniques to develop abiotic stress tolerant crops The editors have also provided detailed references for extended reading to support the information in the book Environmental Stress Physiology of Plants and Crop Productivity is an informative reference for scholars and researchers working in the field of botany agriculture crop science and physiology soil science and environmental sciences

Auxins, Cytokinins and Gibberellins Signaling in Plants Tariq Aftab, 2022-08-18 Plant hormones have pivotal roles in the regulation of plant growth development and reproduction Their signaling pathways are interconnected in a complex network which provides plants with an enormous regulatory potential to rapidly adapt to their environment and to utilize their limited resources for growth and survival in a cost efficient manner Auxin is a hormone molecule whose activity levels are most important for its regulatory roles during plant cell organ and tissue development Therefore the precise regulation of auxin levels is an essential mechanism to fine tune the activity of this powerful hormone during plant growth and development Likewise cytokinins exhibit a wide range of physiological functions including regulation of shoot and root apical meristems stimulation of branching vascular development chloroplast differentiation stabilization of the structure and function of the photosynthetic machinery delay of senescence stomata opening and elevation of the sink strength and nutritional signaling Moreover gibberellins also regulate many aspects of plant growth and development including seed germination stem elongation leaf expansion and flower and fruit development The broad implication of gibberellins in plant development is strictly associated with tight regulation of their metabolism by multiple environmental and endogenous factors ranging from light and temperature to other hormones including feedback control Understanding the significant roles of these phytohormones in plant biology the current subject has attracted the attention of scientists from across the globe This comprehensive volume Auxins Cytokinins and Gibberellins Signaling in Plants highlights the various prospects involved in the current scenario The book comprises the chapters from diverse areas dealing with biotechnology molecular biology proteomics genomics metabolomics etc Climate-Resilient Agriculture, Vol 2 Mirza Hasanuzzaman, 2023-11-09 Under ongoing climate change natural and cultivated habitats of major food crops are being continuously disturbed Such condition accelerates to impose stress effects like abiotic and biotic stressors Drought salinity flood cold heat heavy metals metalloids oxidants irradiation etc are important abiotic stresses and diseases and infections caused by plant pathogens viz fungal agents bacteria and viruses are major biotic stresses As a result these harsh environments affect crop productivity and its biology in multiple complex paradigms As stresses become the limiting factors for agricultural productivity and exert detrimental role on growth and yield of the crops scientists and researchers are challenged to maintain global food security for a rising world population This two volume work highlights the fast moving agricultural research on crop improvement through the stress mitigation strategies with specific focuses on crop biology and their response to climatic instabilities Together with Climate Resilient Agriculture Vol 1 Crop Responses and Agroecological Perspectives it covers a wide range of

topics under environmental challenges agronomy and agriculture processes and biotechnological approaches uniquely suitable for scientists researchers and students working in the fields of agriculture plant science environmental biology and Improving Abiotic Stress Tolerance in Plants M. Igbal R. Khan, Amarjeet Singh, Péter Poór, 2020-05-13 Abiotic stresses such as drought flooding high or low temperatures metal toxicity and salinity can hamper plant growth and development Improving Abiotic Stress Tolerance in Plants explains the physiological and molecular mechanisms plants naturally exhibit to withstand abiotic stresses and outlines the potential approaches to enhance plant abiotic stress tolerance to extreme conditions Synthesising developments in plant stress biology the book offers strategies that can be used in breeding genomic molecular physiological and biotechnological approaches that hold the potential to develop resilient plants and improve crop productivity worldwide Features Comprehensively explains molecular and physiological mechanism of multiple abiotic stress tolerance in plants Discusses recent advancements in crop abiotic stress tolerance mechanism and highlights strategies to develop abiotic stress tolerant genotypes for sustainability Stimulates synthesis of information for plant stress biology for biotechnological applications Presents essential information for large scale breeding and agricultural biotechnological programs for crop improvement Written by a team of expert scientists this book benefits researchers in the field of plant stress biology and is essential reading for graduate students and researchers generating stress tolerant crops through genetic engineering and plant breeding It appeals to individuals developing sustainable agriculture through physiological and biotechnological applications Stress Physiology of Woody Plants Wenhao Dai, 2019-04-17 This book addresses the importance woody plants have in agriculture forestry and the environment and how various stresses affect their performance It reviews physiological and molecular responses of woody plants to major environmental stresses and focuses on the mechanisms involved in imparting resistance to stress Chapters cover basics of plant physiology including plant structure and plant growth photosynthesis respiration plant growth regulation abiotic and biotic plant stresses including drought water logging nutrient deficiency salinity chilling freezing heat oxidative stress and heavy metal toxicity

Insights In Plant-Pathogen Interactions: 2023 Brigitte Mauch-Mani ,Choong-Min Ryu,2025-02-10 We are now well into the second decade of the 21st Century and especially in the last years the achievements made by scientists have been exceptional leading to major advancements in the fast growing field of plant science Frontiers has organized a series of Research Topics to highlight the latest advancements in research across the field of plant science with articles from the Associate Members of our accomplished Editorial Boards This editorial initiative of particular relevance led by Drs Choong Min Ryu and Brigitte Mauch Mani Specialty Chief Editors of the Plant Pathogen Interactions section are focused on new insights novel developments current challenges latest discoveries recent advances and future perspectives in the field of Plant Pathogen Interactions

Exploring Plant Cells for the Production of Compounds of Interest Sonia

Malik,2021-04-10 Natural compounds obtained from plants represent a tremendous global market due to their use as food

additives cosmetics in agriculture and in pharmaceuticals This book provides up to date information on various strategies and methods for producing compounds of interest Leading researchers discuss the latest advances in environmentally friendly natural compound production from plants making the book a valuable resource for biotechnologists pharmacists food technologists and researchers working in the medical and healthcare industries **Biotic and Abiotic Stress Tolerance** in Plants Sharad Vats, 2018-06-11 This book highlights some of the most important biochemical physiological and molecular aspects of plant stress together with the latest updates It is divided into 14 chapters written by eminent experts from around the globe and highlighting the effects of plant stress biotic and abiotic on the photosynthetic apparatus metabolites programmed cell death germination etc In turn the role of beneficial elements glutathione S transferase phosphite and nitric oxide in the adaptive response of plants under stress and as a stimulator of better plant performance is also discussed A dedicated chapter addresses research advances in connection with Capsicum a commercially important plant and stress tolerance from classical breeding to the recent use of large scale transcriptome and genome sequencing technologies The book also explores the significance of the liliputians of the plant kingdom Bryophytes as biomonitors bioindicators and general and specialized bioinformatics resources that can benefit anyone working in the field of plant stress biology Given the information compiled here the book will offer a valuable guide for students and researchers of plant molecular biology and stress physiology alike Plant Growth-Promoting Microorganisms for Sustainable Agricultural Production Everlon Cid Rigobelo, Saveetha Kandasamy, Duraisamy Saravanakumar, 2022-04-18

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