Unripe fruit → Produce ethylene

↓

Turn on genes (for enzyme synthesis)

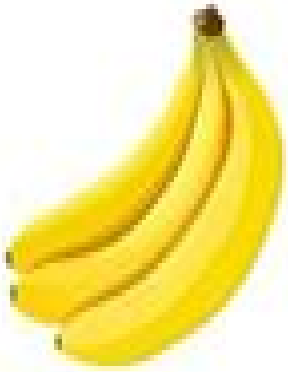
↓

Encode enzymes

↓

Degrade parts of fruits

Results in ←



Fruit ripening

↓

Chlorophyll,
Starch,
Cell wall,

Ethylene In Plants

Huangqi Zhang

Ethylene In Plants:

Ethylene in Plant Biology Samiksha Singh,Tajammul Husain,Vijay Pratap Singh,Durgesh Kumar Tripathi,Sheo Mohan Prasad,Nawal Kishore Dubey,2022-09-06 ETHYLENE IN PLANT BIOLOGY Comprehensive resource detailing the role of ethylene in plant development regulation gene regulation root development stress tolerance and more Ethylene in Plant Biology presents ethylene research from leading laboratories around the globe to allow readers to gain strong foundational coverage of the topic and aid in further ethylene research as it pertains to plant biology The work covers general ideas as well as more specific and technical knowledge detailing the overall role of ethylene in plant biology as a gaseous plant hormone that has emerged as an important signaling molecule which regulates several steps of a plant s life cycle The ideas covered in the work range from discovery of ethylene to its wide roles in plant growth and development all the way to niche topics such as stress acclimation Written by highly qualified authors in fields directly related to plant biology and research the work is divided into 20 chapters with each chapter covering a specific facet of ethylene or the interaction between ethylene and plant health Topics discussed in the text include Our current understanding of ethylene and fruit ripening plus the role of ethylene in flower and fruit development Ethylene implications in root development and crosstalk of ethylene with other phytohormones in plant development Ethylene as a multitasking regulator of abscission processes and powerful coordinator of drought responses Mechanisms for ethylene synthesis and homeostasis in plants along with ethylene and phytohormone crosstalk in plant defense Ethylene and metabolic reprogramming under abiotic stresses as well as ethylene s applications in crop improvement For biologists scientists researchers and policy makers in the agriculture and pharmaceutical industries Ethylene in Plant Biology is a key resource to understand the state of the art in the field and establish a foundation of knowledge that can power future research efforts and practical applications **Ethylene in Plant Biology** Frederick Abeles,2012-12-02 Ethylene in Plant Biology focuses on the role of ethylene in plant physiology and the interrelationship between ethylene fruit ripening and respiration It summarizes the physiology biochemistry production regulation plant effects metabolism and mechanism of action of ethylene This book presents an introduction to basic chemistry of ethylene and available techniques for its sampling and analysis Then it discusses the rate environmental conditions and reactions involved in ethylene production Chapter 4 examines the effects of herbicides and hormones such as auxin gibberellins cytokinins and abscisic acid on ethylene production Meanwhile the next chapter studies the so called stress ethylene phenomenon in plants In particular this book examines the role of insects temperature water gamma irradiation and mechanical and chemical stimuli in stress ethylene The biochemical aspects of ethylene are covered in the subsequent chapters These include its role in growth and development of plant phytogerontological activity role in ethylene synthesis respiration pigmentation and hormone regulation Chapter 9 presents the activity of ethylene relative to other hydrocarbon analogs and dose response relationships for a number of ethylene mediated processes The concluding chapters

tackle the attachment of ethylene to its site of action including epinasty root initiation intumescence formation and floral initiation A discussion on the issue of ethylene air pollution is included This book will be useful to both undergraduate students and professional workers especially those who have background in plant anatomy plant physiology or biochemistry

Ethylene Action in Plants Nafees A. Khan,2007-05-10 The discovery of the plant hormone ethylene was stunning ethylene is a simple gas Our expanding knowledge of the multiplicity of ethylene s roles in plant development physiology and metabolism makes the study of this plant hormone increasingly compelling Elucidation of the genetic regulation of ethylene biosynthesis characterization of ethylene receptors and analysis of the pathway of ethylene signal transduction coupled with the identifi tion of components in the cascade and target genes have provided insight into how this simple molecule can drive such a diversity of divergent processes These scientific advances will lead to new technologies that will further enable researchers to harness the powers of ethylene for the benefit of agriculture In Ethylene Action in Plants classic and emerging roles of ethylene in plant developmental processes are integrated through recent advances ch acterizing ethylene receptors promoters and antagonists and biological and environmental factors that mediate ethylene responses The book s editor Dr Nafees Khan Aligarh Muslim University Aligarh India an expert on ethylene with an impressive number of publications on the interactions between ethylene photosynthesis and growth of Brassica spp brought together a highly qualified group of international experts to provide state the art information To simply list the topics included does not do justice to the book s contents as the articles are not just a compilation of the literature relevant to the topic **The Plant Hormone Ethylene** Antonio Ferrante,Sergi Munné-Bosch,Nafees A. Khan,2022-12-05 The Plant Hormone Ethylene Stress Acclimation and Agricultural Applications presents current knowledge on our understanding of ethylene perception and signaling its role in the regulation of plant physiological processes and its contribution to acclimation in stressful environments Plants regularly face environmental constraints due to their immobile nature In persistently changing environmental conditions several stress factors influence cellular metabolism ultimately causing reduced plant growth and development with a significant loss in agricultural productivity Sustainable agriculture depends on the acclimation of plant processes to the changing environment through altered physiological and molecular responses which are controlled by plant hormones including ethylene Ethylene interacts with other plant hormones and signaling molecules to regulate several cellular processes plant growth and development and ultimately crop productivity This book begins with an introduction to ethylene before providing a detailed study of the latest findings on the role of ethylene in plants including its role in photosynthetic processes flower development leaf senescence nutrients acquisition and regulation of abiotic stress responses as well as its application in agriculture The book is an ideal guide for researchers exploring plant physiology and biochemistry as well as for those investigating the use of ethylene knowledge in agriculture in persistently changing environmental conditions Provides state of the art insights into ethylene regulated photosynthesis growth and productivity in crop plants Presents regulatory mechanisms of ethylene action

Assists in developing physiomolecular strategies for augmenting crop performance in persistently changing environmental conditions **Ethylene in Plants** Chi-Kuang Wen,2014-10-28 This book focuses on recent advances in our understanding of the signal transduction pathway of ethylene its interaction with other hormones and its roles in biological processes It discusses at which point plants could have acquired ethylene signaling from an evolutionary perspective Ethylene was the first gaseous hormone to be identified and triggers various responses in higher plants Our grasp of ethylene signaling has rapidly expanded over the past two decades due in part to the isolation of the components involved in the signal transduction pathway The book offers a helpful guide for plant scientists and graduate students in related areas **Ethylene: A Key Regulatory Molecule in Plants** Nafees A. Khan,M. Iqbal R. Khan,Antonio Ferrante,Péter Poór,2017-12-21 Ethylene is a simple gaseous phytohormone with multiple roles in regulation of metabolism at cellular molecular and whole plant level It influences performance of plants under optimal and stressful environments by interacting with other signaling molecules Understanding the ethylene biosynthesis and action through the plant s life can contribute to improve the knowledge of plant functionality and use of this plant hormone may drive adaptation and defense of plants from the adverse environmental conditions The action of ethylene depends on its concentration in cell and the sensitivity of plants to the hormone In recent years research on ethylene has been focused due to its dual action on the regulation of plant processes at physiological and molecular level The involvement of ethylene in the regulation of transcription needs to be widely explored involving the interaction with other key molecular regulators The aim of the current research topic was to explore and update our understanding on its regulatory role in plant developmental mechanisms at cellular or whole plant level under optimal and changing environmental conditions The present edited volume includes original research papers and review articles describing ethylene s regulatory role in plant development during plant ontogeny and also explains how it interacts with biotic and abiotic stress factors This comprehensive collection of researches provide evidence that ethylene is essential in different physiological processes and does not always work alone but in coordinated manner with other plant hormones This research topic is also a source of tips for further works that should be addressed for the biology and molecular effects on plants **Biology and Biotechnology of the Plant Hormone Ethylene II** A.K. Kanellis,C. Chang,H. Klee,A.B. Bleecker,J.C. Pech,Donald Grierson,2012-12-06 The inflorescence of the monoecious maize plant is unique among the Gramineae in the sharp separation of the male and female structures The male tassel at the terminus of the plant most often sheds pollen before the visual appearance of the receptive silks of th the female ear at a lateral bud normally at the 10 leaf I Earlier studies examined the ontogeny of the growing tissues beginning with the embryo in the kernel through to the obvious protuberances of the growing point as the kernel germinates The differentiated developing soon to become tassel and the lateral bulges that develop into the ears on the lateral buds become apparent very early in the germinating kernel 2 3 46 A certain number of cells are destined for tassel and ear development 8 As the plant develops there is a phase transition 3 16

from the vegetative lateral buds to the reproductive lateral buds This change in phase has been ascribed to genotypic control as evidenced in the differences among different genotypes in the initiation of the reproductive I The genetic control of tassel and ear initiation has been gleaned from anatomical observations Lejeune and Bernier I2 found that maize plants terminate the initiation of additional axillary meristems at the time of tassel initiation This would indicate that the top most ear shoot is initiated on the same day as the initiation of tassel development and this event signals the end of the undifferentiated growing point *The Plant Hormone Ethylene* A. K. Mattoo,2018-01-18 The breadth and depth of knowledge concerning ethylene synthesis and action coupled with the rapid pace of new progress makes a survey of the field a daunting task Therefore experts who were actively engaged in different aspects of ethylene research from different countries spanning four continents were enlisted to complete this monograph This book discusses a historical perspective as well as future trends and possibilities in this field **Annual Plant Reviews, The Plant Hormone Ethylene** Michael T. McManus,2012-04-23 The plant hormone ethylene is one of the most important being one of the first chemicals to be determined as a naturally occurring growth regulator and influencer of plant development It was also the first hormone for which significant evidence was found for the presence of receptors This important new volume in Annual Plant Reviews is broadly divided into three parts The first part covers the biosynthesis of ethylene and includes chapters on S adenosylmethionine and the formation and fate of ACC in plant cells The second part of the volume covers ethylene signaling including the perception of ethylene by plant cells CTR proteins MAP kinases and EIN2 EIN3 The final part covers the control by ethylene of cell function and development including seed development germination plant growth cell separation fruit ripening senescent processes and plant pathogen interactions The Plant Hormone Ethylene is an extremely valuable addition to Wiley Blackwell s Annual Plant Reviews With contributions from many of the world s leading researchers in ethylene and edited by Professor Michael McManus of Massey University this volume will be of great use and interest to a wide range of plant scientists biochemists and chemists All universities and research establishments where plant sciences biochemistry chemistry life sciences and agriculture are studied and taught should have access to this important volume **Advances in Plant Ethylene Research** Angelo Ramina,Caren Chang,Jim Giovannoni,Harry Klee,Pierdomenico Perata,Ernst Woltering,2007-08-03 This volume contains the main lectures and poster contributions presented at the 7th International Symposium on the Plant Hormone Ethylene held in Pisa Italy June 18 22 2006 This international scientific event was organized by the University of Padova and the Scuola Superiore Sant Anna of Pisa and took place on the premises of the Scuola Superiore Sant Anna We would like to thank the Ministry of Agriculture and Forestry the Ministry of University and Scientific Research of Italy the University of Padova and the Scuola Superiore Sant Anna of Pisa for partially funding this symposium Appreciation is also extended to a number of local insti tions that generously contributed to the success of this important event We are indebted to the members of the scientific committee A special appreciation goes to the local organizing committee headed by Prof Giovanni

Serra Finally we gratefully acknowledge Dr Alessandro Botton for handling all the editorial aspects concerning the publication of this volume The Editorial Board *Biology and Biotechnology of the Plant Hormone Ethylene III* Miguel Vendrell,2003 Ethylene is a simple gaseous plant hormone produced by higher plants and also by bacteria and fungi Its physiology is continuously going through new developments in cellular molecular biology and genetic engineering of plants The understanding of the role and function of ethylene in plant growth development fruit ripening senescence etc has been improved through new works and methodologies Studies on ethylene and developmentally regulated processes in ripening of climacteric fruits and a better knowledge on ethylene receptors and antagonists that prevent an ethylene response open possibilities of application of particular value in horticulture and postharvest Advances on the different topics will be published Ethylene and Plant Development J. A. Roberts,G. A. Tucker,2013-10-22 Ethylene and Plant Development documents the Proceedings of the Thirty ninth University of Nottingham Easter School in Agricultural Science held at Sutton Bonington on 26 30 March 1984 The conference was entitled Ethylene and Plant Development and included a workshop organized in conjunction with the Association of Applied Biologists on the Practical control of ethylene in fruit vegetables and flowers This volume contains a mixture of review and research papers thus giving a thorough coverage on the subject The workshop reviewed the practical methods and advantages of either applying ethylene to or removing ethylene from various commercial products The rest of the conference dealt with the more fundamental aspects of ethylene synthesis and action during the developmental processes in which the gas is active Emphasis was particularly placed on the effects of ethylene on gene expression and cell development since advances in these areas may eventually lead to a more scientifically based control of ethylene levels and action within the plant Ethylene’s Role in Plant Mineral Nutrition Francisco Javier Romera,Aaron P. Smith,Rafael Pérez-Vicente,2016-09-07 Terrestrial plants are sessile organisms that differently from animals can not move in searching of the nutrients and water they need Instead they have to change continuously their physiology and morphology to adapt to the environmental changes When plants suffer from a nutrient deficiency they develop physiological and morphological responses mainly in their roots aimed to facilitate the acquisition and mobilization of such a nutrient Physiological responses include some ones like acidification of the rizhosphere and release of chelating agents into the medium and morphological responses include others like changes in root architecture and development of root hairs The regulation of these responses is not totally known but in the last years different plant hormones and signaling substances such as auxin ethylene cytokinins and nitric oxide have been involved in their control Besides hormones oxidative stress has also been related with most of the nutrient deficiencies The relationship of ethylene with the regulation of responses to nutrient deficiencies came from the nineties when some works presented data suggesting its involvement in the regulation of responses to Fe and P deficiency In the last years the role of ethylene has been extended to many other nutrient deficiencies such as K deficiency Mg deficiency S deficiency N deficiency and others In most of the cases it has been found

that ethylene production as well as the expression of ethylene synthesis genes increases under these nutrient deficiencies Furthermore it has also been found that ethylene controls the expression of genes related to responses to different deficiencies The involvement of ethylene in so many deficiencies suggests that it should act in conjunction with other signals that would confer nutrient specificity to the distinct nutrient responses These other signals could be plant hormones auxin cytokinins etc as well as other substances nitric oxide microRNAs peptides glutathione etc either originated in the roots or coming from the shoots through the phloem The role of ethylene in the mineral nutrition of plants is even more complex that the one related to its role in the responses to nutrient deficiencies Ethylene has also been implicated in the N2 fixation of legume plants in salt tolerance responses and in responses to heavy metals such as Cd toxicity All these processes are related to ion uptake and consequently are related to plant mineral nutrition We consider a good opportunity to review all this information in a coordinated way This Research Topic will provide an overview about the role of the plant hormone ethylene on the regulation of physiological and morphological responses to different nutrient deficiencies In addition it will cover other aspects of ethylene related to plant nutrition such as its role on salinity N2 fixation and tolerance to heavy metals

Cellular and Molecular Aspects of the Plant Hormone Ethylene J.C. Pech,A. Latché,C. Balagué,2013-06-29 The International Symposium on Cellular and Molecular Aspects of Biosynthesis and Action of the Plant Hormone Ethylenc vas held in Agen France from August 31 st and September 4th 1992 The planning and management of the scientific and social programme of the Conference were carried out jointly by the Ethylene Research Group of ENSAlINP Toulouse and Agropole Congres Service Agen Since the last meetings in Israel 1984 and in Belgium 1988 ethylene physiology has gone through a period of exciting progress due to new developments in cellular and molecular bioiogy New methods and tools have been developed to better understand the role and functions of ethylene in fruit ripening flower senescence abscission piant growth and cell differentiation Genes involved in ethylene biosynthesis have been characterized and transgenic plants with altered ethylene production have been generated The feasibility of delaying fruit ripening or flower senescence by genetic manipulation is now demonstrated thus opening new perspectives for the postharvest handling of plant products Some progress has also been made on the understanding of ethylene action However much remains to be done in this area to elucidate the ethylene signal transduction pathway Around 140 scientists from 20 countries attended the Symposium They presented 47 oral reports and 40 poster demonstrations All of them are published in these proceedings It has been a pleasure for us to organize this important Symposium and to edit this book Biology and Biotechnology of the Plant Hormone Ethylene A.K. Kanellis,Caren Chang,H. Kende,Donald Grierson,1997-04-30 Ethylene is a simple gaseous plant hormone produced by higher plants bacteria and fungi Thanks to new tools that have become available in biochemistry and molecular genetics parts of the ethylene biosynthesis perception and signal transduction reactions have been elucidated This knowledge has been applied to enhance the quality of a number of agronomically important crops In Biology and

Biotechnology of the Plant Hormone Ethylene leading figures in the field provide surveys of the current state of ethylene biosynthesis and action perception and signal transduction pathways senescence biotechnological control and the involvement of ethylene in pathogenesis and stress Audience Indispensable to all academic industrial and agricultural researchers as well as undergraduates and graduates in plant biology biochemistry genetics molecular biology and food science *Ethylene* Muhammad Arshad,William T. Frankenberger Jr.,2012-12-06 With an ever increasing demand for more food supply agricultural scientists will have to search for new ways and technologies to promote food production In recent decades plant growth regulators PGRs have made great strides in promoting plant growth and development PGRs are organic compounds which have the ability to dramatically affect physiological plant processes when present in extremely low concentrations in the range of micro to picograms Although all higher plants have the ability to synthesize PGRs endogenously they do respond to the exogenous sources most likely due to not having the capacity to synthesize sufficient endogenous phytohormones for optimal growth and development under given climatic and environmental conditions In recent years PGRs have established their position as a new generation of agrochemicals after pesticides insecticides and herbicides Interest in the commercial use of PGRs for improving plant growth and crop yields is also increasing because of their non polluting nature The use of PGRs in the post harvest technology is well established and many new breakthroughs have recently been revealed *Plant Hormones and their Role in Plant Growth and Development* P.J. Davies,2012-12-06 Plant hormones playa crucial role in controlling the way in which plants grow and develop While metabolism provides the power and building blocks for plant life it is the hormones that regulate the speed of growth of the individual parts and integrate these parts to produce the form that we recognize as a plant In addition they playa controlling role in the processes of reproduction This book is a description of these natural chemicals how they are synthesized and metabolized how they work how we measure them and a description of some of the roles they play in regulating plant growth and development This is not a conference proceedings but a selected collection of newly written integrated illustrated reviews describing our knowledge of plant hormones and the experimental work which is the foundation of this knowledge The information in these pages is directed at advanced students and professionals in the plant sciences botanists biochemists molecular biologists or those in the horticultural agricultural and forestry sciences It is intended that the book should serve as a text and guide to the literature for graduate level courses in the plant hormones or as a part of courses in plant or comparative development Scientists in other disciplines who wish to know more about the plant hormones and their role in plants should also find this volume invaluable It is hoped that anyone with a reasonable scientific background can find valuable information in this book expounded in an understandable fashion **Chemistry of Plant Hormones** Nobutaka Takahashi,2018-10-08 The chemistry of the five principal plant hormone groups is discussed in detail in this volume Contributing authors review history and occurrence of each hormone group methods of isolation and detection biosynthesis and metabolism and structural

determination Through these analyses the authors clarify the role of endogenous plant growth regulators in the life cycle of higher plants The text is supplemented with over 350 figures and structures of various plant hormones *Ethylene in Plant Biology* Frederick B. Abeles,1978 *Senescence and Aging in Plants* L.D. Nooden,2012-12-02 Senescence and Aging in Plants reviews the state of knowledge in the processes involved in plant senescence and aging The book begins by discussing the emergence of senescence as a concept experimental analysis of senescence and patterns of senescence It then examines membrane deterioration during senescence photosynthesis in relation to leaf senescence senescence of detached plant organs changing patterns of nucleic acid and protein synthesis during senescence and degradative and associated assimilatory aspects of nitrogen removal This is followed by chapters on aspects of ethylene that may impinge upon its role in promoting senescence of higher plants the role of cytokinins in plant senescence the promoters and retardants of senescence and the role of calcium in plant senescence The concept of whole plant senescence is discussed which can be subdivided into patterns correlative controls cessation of vegetative growth declining assimilatory processes assimilate partitioning and hormonal controls The final chapters cover the deterioration of cellular membranes during the plant aging process and seed aging

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