

ABSTRACT BOOK

The 4th China-ASEAN Horticultural Product Postharvest Conference

"Shaping the Sustainable Future of ASEAN-China Postharvest Technology and Food Security through Smart Innovation"

3-4 November 2025

Grand Richmond Stylish Convention Hotel,
Nonthaburi, Thailand



WELCOME!

Horticultural commodity exchanges between ASEAN nations and China have grown significantly in recent years. However, collaboration in horticultural science and technology has remained limited. The first major steps toward stronger cooperation were initiated by Zhejiang University through researcher and student exchanges, and further supported by the China-ASEAN Horticultural Product Postharvest Conference. The first three conferences were successfully held in China, demonstrating the potential of deeper collaboration in this field. With this success, it became clear that alternating the host country between China and ASEAN members would further strengthen the partnership.

Thailand is pleased to host the 4th conference in conjunction with the 22nd National Postharvest Technology Conference. This event takes place in Nonthaburi, a province renowned for its natural fruit-growing areas on the outskirts of Bangkok, from November 3 to 5, 2025. Oral presentation topics include packaging, postharvest biology, product quality, and storage of horticultural products.

It is a great honor for Thailand to welcome leading postharvest scientists from across ASEAN and China to share the latest knowledge under the theme “Sustainable Future through Smart Innovation of Horticultural Products.” The conference is organized by Kasetsart University. We sincerely appreciate all participants for their contributions to the preparation and realization of this conference.

We hope you enjoy a wonderful and memorable stay in Nonthaburi, Thailand.



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The 4th China-ASEAN

HORTICULTURAL PRODUCT POSTHARVEST CONFERENCE

2025

Timetable The 4th China-ASEAN Horticultural Product Postharvest Conference
“Shaping the Sustainable Future of ASEAN–China Postharvest Technology and Food Security through Smart Innovation”

3–4 November 2025

GRAND RICHMOND Stylish Convention Hotel, Nonthaburi, Thailand

3November 2025 Conference opening, keynote talks and poster session

Venue: Citrine Room 1&2, 5th floor

Time	Event
07:30 – 09:00	Registration/ Poster setup
09:00 – 09:15	Conference Opening A moment of silence in remembrance of Her Majesty Queen Sirikit The Queen Mother - Welcome Remarks by Emeritus Prof. Dr. Danai Boonyakiat Postharvest Technology Innovation Center, Chiang Mai University and Emeritus Prof. Dr. Jingtair Siriphanich Postgraduate Education & Research Development Project in Postharvest Techonology, Kasetsart University. - Conference Report by Assoc. Prof. Dr. Chanate Malumpong Associate Dean for Research, Academic Services and International Affairs of the Faculty of Agriculture at Kamphaeng Saen - Opening Speech by Assoc. Prof. Dr. Anuchai Pinyopummin The Vice President for Kamphaeng Saen Campus, Kasetsart University
09:15 – 09:45	Time for a commemorative photo
09:45 – 10:20	Keynote talk: “Emerging trends in packaging and storage for horticultural products” By Dr. Pramod V. Mahajan Senior Scientist & Group Leader, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Germany
10:20 – 10:50	Poster session / Coffee Break
10:50 – 11:25	Keynote talk: “Epigenetic regulation of fruit quality” By Prof. Dr. Bo Zhang College of Agriculture and Biotechnology, Zhejiang University, China
11:25 – 12:00	Keynote talk: “Deciphering the palate of Chinese Gen Z through Thai durian value-creation strategies” By Dr. Vorachat Dulyasatien Thai-Chinese Agribusiness Association (TCAB), Thailand
12:00 – 13:00	Lunch

3November 2025

Session 1: Postharvest Innovation/ Postharvest Biology

Venue: Citrine Room 1

Chairperson: Associate Professor Dr. Phatharin Leelaphawat

Time	code	Title
13:00 – 13:30	Invited Speaker	Research and development of active/intelligent packaging materials for application in postharvest fruits By Prof. Dr. Di Wu College of Agriculture and Biotechnology, Zhejiang University, China
13:30 – 13:45	OI-01	Preparation of cushioning and antimicrobial hydrogels based on non-directional freezing-salting out synergism for strawberry preservation Ting Li (China)
13:45 – 14:00	OI-02	Study on photodynamic inactivation based on potassium iodide-enhanced riboflavin for preservation of fresh-cut apples Yibo Liu (China)
14:00 – 14:15	OI-03	Preparation of konjac glucan-based composite packaging materials for fresh-cut apple preservation Zhixin Li (China)
14:30 – 15:00		Poster session / Coffee Break

3 November 2025

Session 2: Postharvest Innovation/ Postharvest Safety/ Postharvest Biology/ Postharvest Logistics

Venue: Citrine Room 1

Chairperson: Assistant Professor Dr. Sasitorn Tongchitpakdee

Time	code	Title
15:00 – 15:15	OI-04	Polyphenol-based functional materials: structural insights, composite strategies and biomedical applications Xue Songwen (China)
15:15 – 15:30	OI-05	Molecular dynamics insight into theanine-induced conformational stabilization and gelation of walnut protein isolate Wen Tan (China)
15:30 – 15:45	OI-06	Zinc oxide nanoparticles incorporated in natural rubber latex Kyaw Kyaw Naing (Thailand)
15:45 – 16:00	OS-01	Plasma-activated water, sodium chlorite, and acidified sodium chlorite synergistic effect in preventing browning and fungal growth in aromatic coconut mesocarp Aris Armanto (Indonesia)
16:00 – 16:15	OS-02	Effect of ozone fumigation on the postharvest quality of pineapple Nazifi Umar Ahmad (Nigeria)
16:15 – 16:30	OB-02	Effects of electrical conductivity and fertilizer frequency on the growth, yield and postharvest quality of Wasabi ‘Daruma’ (<i>Eutrema japonicum</i>) in substrate culture system Suchanuch Jaipinta (Thailand)
16:30 – 16:45	OL-01	Predicting kale quality using machine learning models in a virtual cold chain environment Mr.Nattawat Nattachanasit (Thailand)

Dinner

Venue: At East restaurant, 5th floor

18:00 – 20:00	Buffet dinner is available at your convenience
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4 November 2025

Session 3: Postharvest Innovation/ Postharvest Biology

Venue: Citrine Room 1

Chairperson: Assistant Professor Dr. Sompid Samipak

Time	code	Title
08:30 – 08:45		Registration / Coffee Break
08:45 – 09:15	Invited Speaker	A critical assessment of fruit and vegetable postharvest losses in the Gulf region By Assoc. Prof. Dr. Pankaj B. Pathare College of Agricultural & Marine Sciences, Sultan Qaboos University, Oman
09:15 – 09:30	OI-07	Development of a web application for automated mango image processing and feature analysis Pathomphong Chaichuay (Thailand)
09:30 – 09:45	OB-03	Availability of growing-degree-days model for predicting durian fruit harvest date Misato Imai (Japan)
09:45 – 10:00	OB-04	Cold storage delays peach fruit softening via m6A reader PpYTHDFE1-mediated degradation of cell wall-loosening transcript PpEXP3 Hanqing Wang (China)
10:00 – 10:15	OB-05	SLE8 brakes ethylene production in postharvest tomato fruit Dongdong Li (China)
10:15 – 10:30	OB-06	FaMAPK3 phosphorylates FaOR in regulating furanone biosynthesis in strawberry fruit under low temperature Yanni Dong (China)
10:30 – 10:45		Poster session / Coffee Break

Session 4: Postharvest Biology

Venue: Citrine Room 1

Chairperson: Dr. Yosapol Harnvanichvech

Time	code	Title
10.45 – 11.00	OB-07	Research on the regulatory mechanism of programmed cell death (PCD) in postharvest broccoli Feng Xu (China)
11.00 – 11.15	OB-08	The cross-talk of ethylene and abscisic acid in regulating banana fruit ripening Xiaoyang ZHU (China)
11.15 – 11.30	OB-09	Isolation and identification of the main fungal pathogens of peach fruit and postharvest control methods Yingying Wei (China)
11.30 – 11.45	OB-10	Use of onion aqueous extract in the quality enhancement of fresh-cut potatoes Shu Jiang (China)
11.45 – 12.00	OB-11	Synergistic effects of controlled atmosphere storage and plant oil-based coating for extending fruit storage life Mr. Wan Mohd Reza Ikwon Bin Wan Hussin (Malaysia)
12:00 – 12:15		Closing ceremony and awards
12:15 – 13:00		Lunch

Poster Presentation: The 4th China-ASEAN Horticultural Product Postharvest Conference

Poster session: Postharvest Biological		
Code	Title	Presenter
PB-01	Effects of 1-Methylcyclopropene as ethylene inhibitors on extending storage times of pink cosmos edible flowers for decorative purposes	Achiravich Savok
PB-02	Effect of sealed HDPE bag on postharvest quality of sacred lotus (<i>Nelumbo nucifera</i> Gaertn.) after during cold storage	Pattamawan Anusornpornpong
PB-03	Steam blanching preserves postharvest quality and functional compounds in tamarind (<i>Tamarindus indica</i> L.) pulp	Surassawadee Promyou
PB-04	Hypobaric cold storage improves post-harvest quality of Chinese bayberry fruit	Jiafei Qian
PB-05	‘Carabao’ mango fruit quality and antioxidant activity as influenced by fruit bagging and harvesting at later maturity stage	Michael Angela Jaso Urquiola
PB-06	Evaluation of fruit size and shelf-life quality in mango (<i>Mangifera indica</i> L.) varieties ‘Bao’ and ‘Pimsaen Bao’ as a basis for harvest index development	Phealay Sean
PB-07	From bruise to breakdown: Multi-omics of transport-induced deterioration in apples	Pramod Mahajan
PB-09	The C2H2-GGAT regulatory module fine-tunes glutamate homeostasis to improve fruit flavor and enhance disease resistance in peach	Yike Su
PB-10	Auxin-ethylene crosstalk modulates postharvest softening and ripening in peach fruit	Yanyan Sun
PB-11	Study on the function of tomato SLC5A2 and its regulation mechanism on fruit softening	Xiu Shu
PB-12	Flavonol biofortification in tomato extends postharvest shelf life and improves resistance against <i>Botrytis cinerea</i>	Ruining Zhang
PB-13	Genome-wide profiling reveals that HDA1 regulates tomato fruit ripening through targeted histone deacetylation	Jingyu Wang
PB-14	Enhancing postharvest quality to support emerging tomato growers in Tak Province	Parichart Burns

Poster session: Postharvest Safety		
PS-01	Spirogyra residue-based edible coating for maintaining postharvest quality and safety of tomatoes	Wipada Siri-anusornsak
Poster session: Postharvest Logistics		
PL-01	Local in-transit handling trial of ‘Puyat’ durian (<i>Durio zibethinus</i> L.) fruit from Davao city to Laguna, Philippines	Daisic De Asis Bello
Poster session: Postharvest Innovation		
PI-01	Design and development of an acoustic-based mobile application for non-destructive postharvest durian ripeness assessment	Michael Angela Jaso Urquiola
PI-02	Tasting with algorithms: AI for mango flavor identification	Natthaphat Manasompong

Emerging Trends in Packaging and Storage for Horticultural Products

Pramod V. Mahajan^{1*}

Abstract

Advances in packaging and storage are transforming postharvest management of horticultural produce by integrating sensing, modelling and intelligent control. Recent research demonstrates how real-time monitoring of microclimate variables such as gas concentrations, airflow, surface condensation and heat flux enables dynamic management of respiration and moisture in commercial cold chains. Novel sensors developed for apple storage provide continuous in-situ measurements of O₂/CO₂ exchange, airflow distribution and condensation events, forming the basis for predictive control of modified and controlled atmosphere systems. Mathematical models describing respiration kinetics, gas diffusion, transpiration and condensation risk were coupled with sensor data to design equilibrium MAP and to predict ethylene accumulation for optimal scavenger placement. These models also drive microcontroller-based systems that automatically regulate O₂ and CO₂ levels using simple hardware, eliminating the need for costly gas analyzers. Integration of sensing and modelling within a digital-twin framework enables real-time prediction of mass loss, condensation, and shelf life, supporting energy-efficient and low-waste storage operations. These innovations highlight the emerging trend toward smart, data-driven packaging and storage technologies that can be scaled across horticultural supply chains to extend shelf life and reduce postharvest losses.

Keywords: modified atmosphere packaging, controlled atmosphere storage, sensors, gas exchange, condensation, digital twin

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Epigenetic Regulation of Fruit Ripening and Quality Traits

Bo Zhang^{1*}

Abstract

People purchase fruits based on their attractiveness in terms of size, color, nutrition, or, most crucially, flavor. Consequently, numerous studies have delved into the regulation of quality traits during fruit ripening and postharvest storage. Nevertheless, research on flavor regulation has fallen behind; only genes encoding biosynthetic enzymes and transcription factors for a limited number of related volatiles have been characterized. In recent years, certain studies have emphasized the significance of epigenetic changes during fruit ripening and postharvest storage. The role of epigenetic modifications, such as DNA methylation and RNA methylation, in regulating fruit flavor quality has been proposed. Additionally, the interaction between transcription factors and epigenetic modification enzymes has been introduced during fruit ripening and quality trait formation.

Keywords: fruit, quality, ripening, postharvest, epigenetics

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Deciphering the Palate of Chinese Gen Z through Thai durian value-creation strategies

Vorachat Dulyasatien^{1*}

Abstract

Thai durian, the historical market leader in China, is facing escalating price pressure and intense competition, pushing it towards a state of commoditization. This paper proposes a strategic transformation aimed at deciphering the palate and behaviors of Chinese Gen Z—a highly influential and trend-setting demographic. The objective is to elevate Thai durian from an agricultural commodity to a premium lifestyle brand. The analysis focuses on the unique characteristics of Chinese Gen Z, including their status as 'Digital Natives' (active on platforms like Douyin and Xiaohongshu), their high prioritization of aesthetics (颜值 - Yánzhí), their pursuit of experiences and self-pleasure (悦己 - Yuè Jǐ), and their demands for both convenience and health. A holistic, five-pronged value-creation strategy is proposed. This includes: 1) Product Innovation (e.g., tasting kits, single-serving portions); 2) Packaging Revolution (focusing on aesthetics and the 'unboxing' experience); 3) Digital Storytelling (emphasizing authenticity); 4) O2O Channel Strategy (integrating e-commerce like Hema and Tmall with physical pop-up stores); and 5) Experiential Marketing (such as a 'Durian Omakase' to create FOMO). The paper concludes that the success of this brand transformation is fundamentally contingent upon the ability to consistently deliver perfect quality. This capability is rooted in superior post-harvest technology, which serves as the critical "action" required to build consumer trust and ensure sustainable success in a highly competitive market.

Keywords: Thai durian, chinese gen Z, value creation, digital marketing strategy, consumer behavior, lifestyle branding, post-harvest technology, chinese market

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Research and Development of Active/Intelligent Packaging Materials for Application in Postharvest Fruits

Di Wu^{1*} and Kunong Chen¹

Abstract

Fruit is a fundamental component of the human diet, and ensuring a stable and diverse supply of high-quality fruit products is essential for enhancing quality of life. However, the limited ability to maintain freshness after harvest often leads to rapid deterioration and spoilage. These losses underscore the urgent need for more effective preservation strategies. To address this challenge, packaging technologies are undergoing a significant transformation. As consumer demand for safer, healthier, and higher-quality food continues to grow, packaging is no longer confined to conventional protective functions but is evolving toward active and intelligent roles. Active packaging, particularly systems with antimicrobial and freshness-preserving properties, helps mitigate deterioration and extend shelf life, while intelligent packaging enables real-time monitoring and quality assessment to counter rapid decline caused by metabolic processes and environmental stress. Collectively, active and intelligent packaging materials represent indispensable strategies for extending shelf life and reducing postharvest waste in fruits and vegetables. Building on this background, our research group has developed active and intelligent packaging materials in diverse forms, including casting films, nanofiber films, and hydrogels. Among these, casting films were engineered with specific functionalities, such as methyl jasmonate-loaded composites to alleviate chilling-induced lignification in loquat and deacetylated konjac glucomannan films functionalized with anti-browning agents for fresh-cut apple preservation. Nanofiber systems were explored more extensively, encompassing natamycin-loaded gelatin/zein/polyurethane fibers with sustained antifungal activity, chitosan/PCL fibers incorporating thymol/HP β CD complexes for cherry tomato preservation, covalent organic framework composites with temperature-responsive release, boron nitride nanosheet-based mats with enhanced thermal conductivity and antibacterial activity, amphiphilic polyquaternium fibers with antimicrobial properties, PCL/EC nanofibrous films containing natamycin and trans-cinnamic acid, multifunctional fibrous films for fresh-cut apple preservation, and carvacrol-loaded porphyrin frameworks with synergistic antibacterial effects. In addition to benchtop MBS spinning, a handheld MBS device was employed to directly fabricate PCL/EC nanofiber films loaded with natamycin and trans-cinnamic acid in situ on mango surfaces, which were subsequently applied for preservation. Furthermore, hydrogel-based materials were developed, such as wearable conductive hydrogels enabling real-time quantitative monitoring of compression forces on fruit surfaces. Collectively, these works contribute to improved postharvest preservation and reduced losses across the fruit supply chain.

Keywords: postharvest fruits, preservation, active packaging, intelligent packaging, casting films, nanofiber film, hydrogel

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A Critical Assessment of Fruit and Vegetable Postharvest Losses in the Gulf Region

Pankaj B. Pathare^{1*}

Abstract

Postharvest losses (PHL) pose a significant, yet often underestimated, challenge to both the economic viability and food security mandates of the Gulf Cooperation Council (GCC) region. Exacerbated by severe thermal stress, inadequate logistics, and mechanical injury, current PHL rates are unsustainable. It delivers a critical, data-informed assessment of wastage points and highlights the strategic shift required toward multidisciplinary, engineering-driven solutions. It showcases diverse research innovations crucial for supply chain resilience. This includes advanced assessment techniques, such as Computer Vision Systems (CVS) for monitoring exterior damage in fresh produce, and using pendulum impact tests to study physiological degradation in fruits due to mechanical stress. Preservation strategies are examined through the lens of cold plasma technology for microbial control and quality maintenance in date fruit during cold storage. Furthermore, the work addresses logistical integrity by evaluating simulated transport vibration and optimizing package design performance for banana quality. Finally, we explore sustainable processing solutions, including the performance of Combined Hot-Air-Infrared Hybrid Dryers for zucchini slices and methods for quality improvement of dried anchovies using solar drying. These engineering interventions are vital for reducing the estimated 30–50% wastage rates and achieving regional food sustainability.

Keywords: postharvest, computer vision, simulated transport, anchovy drying, infrared drying

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Abstract Oral Presentation

Preparation of Cushioning and Antimicrobial Hydrogels Based on Non-Directional Freezing-Salting out Synergism for Strawberry Preservation

Ting Li ^{1*}, Ziqiang Qin¹, Di Wu¹ and Kunsong Chen¹

Abstract

Packaging plays a vital role in protecting fruit during storage and transportation while minimizing physical damage. Hydrogels have attracted increasing interest as postharvest packaging materials due to their soft texture, porosity, and tunable properties. However, traditional hydrogels exhibit weak mechanical properties such as low strength, limited toughness, and poor fatigue resistance, which restrict their application in fruit postharvest packaging. The combination of freezing and salting is an emerging strategy to improve the mechanical properties of hydrogel, however, it has not been applied to develop fruit packaging materials with both high mechanical strength and cushioning characteristics. This study developed mechanically enhanced hydrogel materials based on the synergistic effects of non-directional freezing and salting, and evaluated their ability to absorb stresses such as vibration and impact typically encountered during fruit storage and transportation. Subsequently, hydrogel pads (contact type) and films (non-contact type) with antibacterial functions were developed by incorporating tannic acid and thymol, respectively, to suit different preservation scenarios. Strawberries possess a distinctive flavor that consumers highly favor. However, their soft texture makes them extremely susceptible to mechanical damage and microbial contamination after harvest, leading to fruit rot and spoilage. Ultimately, strawberries were selected as a perishable fruit model for conducting antimicrobial preservation tests. The results demonstrated that the synergistic non-directional freezing/salting synergistic approach successfully produced dual-crosslinked hydrogels with significantly improved mechanical properties. This hydrogel material effectively reduced mechanical damage during strawberry storage and transportation. When incorporated with natural antimicrobial agents, it showed strong preservation effects in both contact and non-contact modes, markedly inhibiting pathogen growth and delaying fruit deterioration. This study provides multifunctional hydrogel-based packaging with cushioning and antimicrobial properties for postharvest strawberry storage and transportation, while also providing new insights into the development of fruit preservation packaging.

Keywords: strawberry, postharvest, cushioning protection, antimicrobial, hydrogel, mechanical property enhancement

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Study on Photodynamic Inactivation Based on Potassium Iodide-Enhanced Riboflavin for Preservation of Fresh-cut Apples

Yibo Liu^{1*}, Zheng Wu¹, Jiayue Jin¹, Di Wu¹ and Kunsong Chen¹

Abstract

In the present study, 'Red Fuji' fresh-cut apples were used as the research material. Targeting common food-borne pathogens (*E. coli*) and spoilage fungi (*P. expansum*) on the surface of fresh-cut apples, research on sterilization and preservation by photodynamic inactivation based on potassium iodide-enhanced riboflavin was carried out. Fresh-cut fruits are ready-to-eat foods made from fresh fruits, which have the advantages of freshness and convenience. However, fresh-cut fruits were prone to problems such as enzymatic browning, water loss, and microbial contamination. Sterilization treatment was an important way to maintain the edible quality of fresh-cut fruits and vegetables and ensure consumer health. Compared with traditional chemical sterilization technology, photodynamic inactivation was a new type of non-thermal physical sterilization technology, which had the advantages of green safety, broad-spectrum sterilization, and simple operation, and it became a hot spot in the field of non-thermal food sterilization. The present study made sure the optimal parameters of potassium iodide-enhanced photodynamic inactivation of riboflavin. The addition of potassium iodide could significantly enhance the photodynamic bactericidal effect of riboflavin, and the number of bactericidal cells increased to 3.62 and 4.16 log₁₀ CFU / mL, respectively. Detection of intracellular ROS levels revealed that The addition of potassium iodide increased the level of intracellular ROS by 8.25 times compared with the control group. Microscopic morphological observations confirmed that potassium iodide administration resulted in more severe cell membrane injury. This demonstrated that potassium iodide elevated ROS levels in riboflavin-mediated photodynamic sterilization, thereby enhancing bactericidal activity against *E. coli* and *P. expansum*. The potassium iodide-enhanced riboflavin photodynamic inactivation treatment also did not adversely affect the storage quality of fresh-cut apples. The research results provided an efficient sterilization technology for fresh-cut fruits based on potassium iodide-enhanced riboflavin photodynamic inactivation, and also offered a new path for the application of green physical sterilization technology in the postharvest treatment of agricultural products.

Keywords: fresh-cut apples, postharvest preservation, storage, photodynamic inactivation, ROS

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Preparation of Konjac Glucan-Based Composite Packaging Materials for Fresh-Cut Apple Preservation

Zhixin Li^{1*}, Yile Zhao¹, Di Wu¹ and Kunsong Chen¹

Abstract

Fresh-cut fruits are susceptible to browning, microbial contamination, water loss and softening. Therefore, it is necessary to develop efficient fresh-cut fruit preservation technologies. Active packaging is expected to solve the problems of fresh-cut fruits preservation through functional design. Konjac glucomannan (KGM) has attracted attention due to its good water solubility and high viscosity. In this study, KGM was used as the main raw material to prepare fresh-cut apple preservation packaging, and the study mainly includes four aspects: First, deacetylated konjac glucomannan (DKGM) and carboxylated cellulose nanofibers (CCNF) were employed as film-forming materials to prepare DKGM/CCNF composite packaging films via a dual enhancement strategy, and the results indicated that the deacetylation degree of 13.90% and the blending ratio of DKGM/CCNF of 2:1 were the optimal parameters for preparing composite packaging films, and the tensile strength of DKGM/CCNF composite packaging films was increased by 88.59%, the elongation at break was increased by 185.63%, and the water vapor permeability was reduced by 23.92%. Second, the film with antioxidant function was prepared by loading cysteine and glutathione into the DKGM/CCNF composite packaging films, and no significant browning was observed in fresh-cut apples treated with antioxidant films after nine days of 4°C storage. Third, based on the antioxidant film, epigallocatechin gallate (EGCG) was loaded to create films with antibacterial and antioxidant dual functions. This antibacterial film demonstrated a broad-spectrum antimicrobial effect, with the inhibition rate of *Staphylococcus aureus* reaching more than 80%. Finally, by crosslinking sodium alginate (SA) with Ca²⁺, DKGM/CCNF/SA in-situ coating technology was developed to address the issue of water loss and softening in fresh-cut apples, and the weight loss rate of the in situ coated group was 4.61% lower than that of the control group. This study provided new ideas for the functionalized design of fresh-cut apple preservation packaging.

Keywords: fresh-cut apples, preservation, browning, antibacterial, water loss and softening, composite packaging film, In-situ coating

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Polyphenol-Based Functional Materials: Structural Insights, Composite Strategies and Biomedical Applications

Songwen Xue^{1*}, Wen Tan¹, Shuifang Mao¹, Haibo Pan¹, Xingqian Ye^{1,2},
Natthawuddhi Donlao³ and Jinhu Tian^{1,4}

Abstract

Polyphenols hold significant promise in pharmaceutical, biotechnology and food-related applications owing to their potent free radical scavenging, antimicrobial, antitumor and others properties. The unique chemical architecture—featuring multiple phenolic hydroxyl groups and aromatic ring systems—confers a high capacity for both non-covalent (e.g., hydrogen bonding, π - π stacking, metal ion coordination) and covalent (e.g., Michael addition, Schiff base formation) interactions. These versatile interaction modes underpin the rational design and engineering of advanced composite materials with tailored functionalities. This review systematically explores the sources, structures and physiological activities of polyphenols, elucidating their interaction mechanisms with different materials. Emphasis is placed on the design of polyphenol-based nanomaterials, bioactive scaffolds, and smart drug delivery platforms capable of modulating local microenvironments and orchestrating cellular responses for precision therapeutic interventions. The translational potential of these functional materials in regenerative and precision medicine is also critically examined, alongside key challenges such as stability, responsiveness, and the fine-tuning of release kinetics.

Keywords: polyphenol, self-assembly, functional materials, biomedical applications

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Molecular Dynamics Insight into Theanine-Induced Conformational Stabilization and Gelation of Walnut Protein Isolate

Wen Tan^{1*}, Qinjun Zhang¹, Changqing Wei², Xingqian Ye¹ and Jinhu Tian^{1,3}

Abstract

This study employed a structure-modulation strategy mediated by theanine to elucidate its multiscale mechanism for enhancing the gelation behavior of walnut protein isolate (WPI). The results indicated that theanine induced a conformational shift in WPI from an α -helical structure to a β -sheet conformation, exposing hydrophobic residues and promoting disulfide bond formation. This enhanced the gel network's density, hardness, thermal stability, and water retention capacity (82.2%). Molecular docking and kinetic simulations revealed that theanine formed stable complexes with WPI, exhibiting the strongest binding affinity with 11S globulin (-62.48 kcal/mol), thereby promoting ordered aggregation and network formation. Additionally, theanine mitigated intrinsic conformational fluctuations in 2S albumin, stabilizing the complex. These findings provided a theoretical basis for the development of high-value, stable WPI gel food products.

Keywords: walnut protein isolated, theanine, composite gel, texture, molecular interactions

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Zinc Oxide Nanoparticles Incorporated in Natural Rubber Latex Cushion to Control Anthracnose Disease of ‘Nam Dok Mai See Thong’ Mango

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Abstract

Anthracnose, caused by *Colletotrichum acutatum*, is one of the most significant postharvest diseases affecting mangoes, resulting in substantial economic losses due to fruit decay and quality deterioration. ‘Nam Dok Mai See Thong mango’ is one of the economic fruit crops in both domestic and export markets, particularly Japan and South Korea. This study investigates active cushioning made from natural rubber latex foam nets (NRLF) embedded with zinc oxide (ZnO) particles and compared it conventional expanded polyethylene foam nets (EPE). The research objectives aimed to 1) investigate the effectiveness of different types of ZnO particles against *C. acutatum* using an *in vitro* test, and 2) to investigate the performance of ZnO-incorporated NRLF in delaying anthracnose incidence in ‘Nam Dok Mai See Thong’ mangoes through an *in vivo* test. The NRLF embedded with nano ZnO (n0.5ZnO-NRLF, n1.0ZnO-NRLF, n1.5ZnO-NRLF, and n2.0ZnO-NRLF), micro ZnO (m2.0ZnO-NRLF, and m4.2ZnO-NRLF), and EPE as control (without ZnO). The mature mangoes were inoculated with *C. acutatum* spores and evaluated for lesion areas. In the *in vitro* PDA assay, results showed that NRLF of nano ZnO concentrations with n1.5ZnO-NRLF and n2.0ZnO-NRLF exhibited significantly larger inhibition zones than those of n0.5ZnO-NRLF and n1.0ZnO-NRLF concentrations. Both micro ZnO concentrations (m2.0ZnO-NRLF and m4.2ZnO-NRLF) exhibited smaller inhibition zones than those of all nano ZnO concentrations, as compared to (EPE, control), without an inhibition zone. In an *in vivo* study, mature ‘Nam Dok Mai See Thong’ mangoes were inoculated with *C. acutatum* spores and stored at 25°C for 9 days. The lesion of anthracnose disease was analyzed using image analysis to determine lesion area (LA), fractal dimension (FD), and chroma color. Results showed that the n1.0ZnO-NRLF exhibited the lowest LA, while micro ZnO concentrations provided less efficiency to inhibit the LA of anthracnose after 9 days. There was no significant difference in the FD of all treatments. The n1.5ZnO-NRLF cushions exhibited the highest chroma level in inoculated mango than those with the lowest chroma level of n0.5ZnO-NRLF and EPE, control after storage for 5 days. Overall, NRLF cushions embedded with a range of n1.0ZnO-NRLF and n1.5ZnO-NRLF nano ZnO provided the most effective control of anthracnose disease, as compared to other micro ZnO and EPE without ZnO both in vivo and vitro tests. These findings suggest that ZnO-embedded NRLF cushions offer a sustainable and effective alternative to EPE for postharvest management of anthracnose in mangoes.

Keywords: cushion, *colletotrichum acutatum*, expanded polyethylene, lesion area, image analysis

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Plasma-Activated Water Enhances the Efficacy of Chlorite Treatments Against Browning and Fungal Growth in Aromatic Coconut Mesocarp

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Abstract

Aromatic coconuts are commonly trimmed to enhance their appearance and market value. However, the trimming process often induces enzymatic browning and fungal contamination of the mesocarp surface. This study investigated the effect of sequential plasma-activated water (PAW) and chlorite-based treatments on browning and fungal growth in aromatic coconut mesocarp. Coconut mesocarps (4.0 × 4.5 cm) were dipped for 5 min in PAW, followed by sodium chlorite (SC) or acidified sodium chlorite (ASC) for 5 min. Filtered water (FW) and sodium metabisulfite (SMS) served as controls. All samples were stored at 4°C for 9 days. Results showed that PAW followed by SC and PAW followed by ASC effectively inhibited browning. Notably, PAW followed by ASC significantly reduced fungal growth, whereas PAW followed by SC did not. These findings suggest that sequential PAW-ASC treatment has potential for controlling browning and fungal contamination in coconut mesocarp. However, further studies are needed to validate and optimize the treatment conditions in commercial applications.

Keywords: plasma technology, sodium chlorite, acidified-sodium chlorite, fungal growth, enzymatic browning

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Effect of Ozone Fumigation Period on the Postharvest Quality of 'Pattavia cv.' Pineapple

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Abstract

Postharvest decay and senescence are major limitations to the storage and export of pineapple (*Ananas comosus*), resulting in significant quality loss and economic impact. This study evaluated the effectiveness of ozone fumigation at different exposure durations in suppressing decay and delaying senescence in pineapples. Fruits were fumigated with ozone gas at 325-350 ppm at the flow rate of 6 mL/min for 0 (control), 20, 40, and 60 min and stored at 13°C and 95 % RH for 25 days. Quality assessments, including disease incidence and severity, weight loss, peel color, and internal browning score, were recorded. The results showed that ozone fumigation markedly reduced color change, internal browning, and decay compared with the control. After 20 days of storage, fruits fumigated for 60 min exhibited a 60 % reduction in disease severity relative to the control, while both the 40 and 60 min treatments maintained lower b* values, indicating delayed yellowing or ripening. However, ozone fumigation has no significant effect on weight loss across treatments. These findings demonstrate that ozone fumigation with an exposure time of 40-60 min is an effective treatment to extend storage life and preserve the visual quality of pineapple fruit.

Keywords: senescence, postharvest decay, storage life

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Effects of Electrical Conductivity and Fertilizer Frequency on the Growth, Yield and Some Quality Attributes of Wasabi cv. 'Daruma' (*Eutrema japonicum*) in Substrate Culture System

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Abstract

This study examined the combined effects of electrical conductivity (EC) levels and fertilizer frequency on the growth, yield, and some quality attributes of wasabi (*Eutrema japonicum* cv. 'Daruma') under controlled conditions. A nine-month factorial experiment using three EC levels (1, 2, and 3 mS cm⁻¹) and two fertilizer frequencies (weekly and biweekly) revealed significant EC × fertilizer frequency interactions. The combination of moderate EC (2 mS cm⁻¹) and weekly fertilization resulted in the highest photosynthetic rate, vigorous growth, and greatest rhizome yield, while also enhancing the 2-propenyl-glucosinolate content in rhizomes during storage. In contrast, low EC with biweekly fertilization limited growth, whereas high EC (3 mS cm⁻¹) mainly promoted petiole and leaf elongation without yield improvement. Overall, optimal EC management combined with frequent fertilization synergistically improved nutrient uptake, physiological efficiency, and storability, providing an effective strategy for high-quality wasabi production.

Keywords: brassicaceae, glucosinolates, wasabi, electrical conductivity (EC), fertilization frequency

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Predicting Kale Quality Using Machine Learning Models in a Virtual Cold Chain Environment

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Abstract

Kale is a nutritionally dense leafy green known for its elevated vitamin, mineral, and antioxidant levels. However, like other leafy greens, it is highly perishable, losing quality rapidly after harvesting, caused by temperature and humidity fluctuations. These changes lead to weight loss, water loss, and discoloration, reducing both quality and market value. In this study, we utilize a machine learning model for examining the relationship among kale quality, temperature, and color. These investigations outline a machine learning-based approach to predicting percentage weight loss over time in kale. On the first day, the initial weight and a photograph of the kale were recorded. Then, the kale samples were stored at four distinct temperatures (5°C, 10°C, 15°C, and 20°C) for eight days under controlled conditions. As part of the image processing, background segmentation was applied to remove the background from each kale image. The processed images were then analyzed based on color space and texture features, including RGB, HSV, Lab, Local Binary Patterns (LBP), and Gray Level Co-occurrence Matrix (GLCM). Moreover, we deployed Pearson correlation analysis, which revealed correlations among % weight loss and selected features. The results indicated that Lab had the highest correlation, and the features with high correlations were subsequently used to train the multiple prediction regression models. The Extreme Gradient Boosting Regressor (XGBoost Regressor) achieved the highest predictive performance, with an R^2 value of 0.96 and an RMSE of 0.91. Finally, we deployed the predictive model to the website that allows users to process and analyze images of kale.

Keywords: kale, weight loss prediction, image processing, time series forecasting, XGBoost

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Development of a Web Application for Automated Mango Image Processing and Feature Analysis

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Abstract

Namdokmai Sithong mangoes are one of the most important tropical fruits in Thailand, and they also play a key role in both agriculture and international trade. Mangoes have distinct physical characteristics, and researchers have manual grading based on images, which is still practiced, but it also remains inefficient and inconsistent, which is also time-consuming and error-prone. In response to these challenges, this study presents a web-based system that automatically extracts mango color, texture, and shape features to enhance postharvest quality assessment. The system computes color values in RGB, HSV, L*a*b*, and Grayscale, and it also derives texture descriptors using Gray-Level Co-occurrence Matrix (GLCM), Local Binary Pattern (LBP), and Gabor filters. Geometric and shape attributes such as area, perimeter, aspect ratio, and eccentricity are measured, and results are also compiled into Excel files. The web application also includes a background removal module based on K-Means clustering, and accuracy is also enhanced by isolating the mango fruit. Therefore, the proposed platform addresses the need for specialized software and makes it suitable for both laboratory research and practical agricultural quality assessment.

Keywords: postharvest quality assessment, web-based tool, feature extraction, image processing, remove background

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Availability of Growing-Degree-Days Model for Predicting Durian Fruit Harvest Date

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Abstract

Durian is one of the most economically important fruit crops in Thailand, with the cultivar Monthong highly demanded in both domestic and international markets. Accurate harvest timing is essential to obtain optimum fruit quality. Growing degree-days (GDD), which represent the cumulative heat units above a base temperature required for a crop to reach a developmental stage, have been widely used to predict maturity in many crops. Since durian growth is also known to be influenced by temperature, the application of GDD models appears promising; however, GDD-based models for durian are scarce, and its unique growth pattern could complicate prediction. This study aimed to develop and validate GDD models for durian by testing different base and ceiling temperatures and accumulation start dates to achieve accurate prediction of harvest timing. In this study, fruit was harvested weekly from 4 orchards in eastern and southern Thailand and the date when the pulp DM reached 32% was defined as the harvest date for each orchard. Meteorological data from nearby stations were used to calculate GDD under various base temperatures and accumulation start dates. The lowest variation in GDD among orchards was obtained with a base temperature of 8°C and accumulation of daily mean temperatures starting 5 days after flowering, yielding a GDD of approximately 2100 °C-day, with less than 2% variation among orchards. Although this is strictly an inductive approach and requires verification through deductive methods, this study suggests the potential for utilizing thermal time models such as the GDD model in predicting durian harvest dates.

Keywords: thermal-time model, fruits quality, Monthong

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Cold storage delays peach fruit softening via m⁶A reader PpYTHDFE1-mediated degradation of cell wall-loosening transcript *PpEXP3*

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and Bo Zhang^{1,2,4}

Abstract

N⁶-methyladenosine (m⁶A), the most prevalent epitranscriptomic modification in plant mRNAs, functions as a critical regulatory layer governing environmental response. Refrigeration reduces transcripts of cell wall enzymes to delay softening, however whether m⁶A participated in this progress remain unclear. We identified a cold-inducible m⁶A reader PpYTHDFE1 as a regulator that stabilizes peach (*Prunus persica* L.) fruit firmness. Epitranscriptomic analysis revealed that firmness maintenance correlates with reduced levels of m⁶A-modified transcripts such as expansin *PpEXP3*, whose overexpressing accelerates fruit softening. Both in *in vitro* RNA-EMSA and *in vivo* RIP-qPCR assays demonstrate that PpYTHDFE1 recognizes m⁶A-modified *PpEXP3* transcripts. Transcription inhibition assays further confirm that PpYTHDFE1 accelerates the degradation of *PpEXP3* through RNA-protein interaction rather than transcriptional modulation. Mechanistically, PpYTHDFE1 participates in liquid-liquid phase separation as evidenced by fluorescence recovery after photobleaching (FRAP) assays, facilitating *PpEXP3* degradation. Furthermore, overexpression of PpYTHDFE1 decreases *PpEXP3* mRNA levels, while silencing PpYTHDFE1 leads to *PpEXP3* transcript accumulation. A significantly negative correlation was observed between *PpYTHDFE1* transcripts and firmness during fruit cold storage. Fruit firmness is increased by 44% in peach upon *PpYTHDFE1* overexpressing. Our results provide molecular insights into RNA modification-based strategies to reduce postharvest losses and develop cold-resilient horticultural crops.

Keywords: epitranscriptome, liquid-liquid phase separation, low temperature, fruit quality, postharvest biology

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SLE8 Brakes Ethylene Production in Postharvest Tomato Fruit

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Abstract

An excessive ethylene rate in postharvest fruit often causes shorter shelf life, nevertheless, the underpinning mechanism that controls ethylene biosynthesis from a climacteric peak in ripening fruit to a low level in postharvest fruit is largely unknown. Previous studies reveal that suppressing the expression of *SLE8* in tomato leads to remarkably high production of ethylene in postharvest transgenic fruit, indicating that *SLE8* involves in the inhibition of ethylene biosynthesis. We therefore created *sle8* mutants by CRISPR/cas9 technology and confirmed a negative role of *SLE8* in ethylene biosynthesis. Intriguingly, an excessive ethylene production was observed in postharvest stage but not in developing and ripening phases in *sle8* fruit. Transcriptomic analysis reveals that an incredible up-regulation of *SLACOs* in the postharvest *sle8* fruit may cause the over-production of ethylene. We also find that *SLE8* interacts with *SLACO1*. In addition, by heterologously expressing in *Marchantia polymorpha*, an *ACO* gene-free model plant, we further find that the interaction between *SLE8* and *SLACO1* inhibits *SLACO1* activity in producing ethylene. In all, our study uncovers that *SLE8* functions in braking ethylene biosynthesis in postharvest tomato fruit. It remains unclear why the ethylene biosynthesis during fruit development and ripening is not influenced in *sle8 in planta* fruit.

Keywords: ethylene, excessive, *ACO*, interaction, postharvest tomato

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FaMAPK3 Phosphorylates FaQR in Regulating Furanone Biosynthesis in Strawberry Fruit under Low Temperature

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Abstract

Postharvest cold storage is essential for extending the shelf life of strawberry fruits, but it often leads to significant loss of aroma and flavor. But the molecular basis remains poorly understood. Here, we demonstrate that low temperature activates the kinase FaMAPK3, which directly phosphorylates the key furanone synthase FaQR3 at residues Ser-70 and Ser-293. This phosphorylation promotes ubiquitin-dependent degradation of FaQR3, resulting in dramatic reduction of 4-hydroxy-2,5-dimethyl-3(2H)-furanone (HDMF) and its methylated derivative DMMF. While FaQR3 transcript levels remain stable under cold stress, FaQR3 protein abundance declines rapidly and gradually increased during long time storage, revealing a critical post-translational regulatory layer controlling aroma volatility. Further cell-free degradation assays and inhibitor treatments confirmed the involvement of the 26S proteasome pathway. Our study indicates a previously unknown phosphorylation-mediated degradation mechanism that regulates fruit flavor quality, providing new insights into the postharvest biology of strawberries and potential strategies for improving furanone losses.

Keywords: Strawberry (*Fragaria × ananassa*), MAPK signaling, protein phosphorylation, furanone, cold stress, fruit aroma quality

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Research on the Regulatory Mechanism of Programmed Cell Death (PCD) in Postharvest Broccoli

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Abstract

Broccoli is popular with consumers because it is rich in nutrients, but it is highly susceptible to yellowing and senescence after harvest, leading to a decline in its commercial value. Programmed cell death (PCD) is an autonomous, ordered form of death controlled by the plant's genes. Our previous study showed that PCD may be involved in the senescence process of broccoli. Mannose and sucrose treatment could effectively delay the degradation of chlorophyll and PCD process in broccoli. Sucrose treatment delayed the appearance of PCD in broccoli through improving mitochondrial physiological properties. Voltage-dependent anion channel (VDAC) the main protein that makes up the outer mitochondrial membrane, mediates material exchange and transport between mitochondria and cytoplasm and is important for maintaining mitochondrial function. We verified the interaction between BoRAP2-3 and the BoVDAC3 promoter using yeast one-hybrid and dual-luciferase assays and investigated the function of BoRAP2-3 in the yellowing and PCD process of broccoli. Transcriptional activation activity test proved that BoRAP2-3 is a transcriptional activator. Dual-Luciferase reporter assay showed that BoRAP2-3 could positively regulate *BoVDAC3* promoter activity and activate *BoVDAC3* gene expression. Overexpression of *BoRAP2-3* gene accelerates PCD in tobacco BY-2 suspension cells. The expression of *BoRAP2-3* gene increased the ethylene synthesis ability of *Arabidopsis*, decreased the antioxidant level, and also affected the anti-apoptosis ability of *Arabidopsis*.

Keywords: broccoli, PCD, mitochondrial, VDAC

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The cross-talk of ethylene and abscisic acid in regulating banana fruit ripening

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Abstract

1-Methylcyclopropene (1-MCP) has been widely used to manipulate fruit ripening. However, incorrect treatment with 1-MCP may cause ripening disorder. A comprehensive functional enrichment analysis showed that most DEGs involved in photosynthesis, cysteine and methionine metabolism, phenylpropanoid biosynthesis, amino sugar and nucleotide sugar metabolism, plant hormone signal transduction, starch and sucrose metabolism were enriched. Both ethylene and abscisic acid could regulate fruit ripening. However, the multiple regulatory mechanisms remain unclear. Here, we revealed a module that regulates fruit ripening transcriptionally and post-translationally and hormone cross-talk. Ethylene and abscisic acid markedly induced both transcript and protein levels of MaERF113 and MaABI5-like, and MaERF113 activated the expression of genes related to starch (*MaGWD1*, *MaBAM3* and *MaAMY3*) and chlorophyll (*MaSGR1* and *MaPPH*) degradation, which identified important in fruit ripening and disorder by RNA-seq analysis. Ectopic and transient overexpression of *MaERF113* promoted fruit ripening and induced starch and chlorophyll degradation in both banana and tomato, while silencing of *MaERF113* caused an opposite effect. MaERF113 interacted with an E3 ubiquitin ligase MaSINAT5, which ubiquitinated MaERF113 at the K78 site, mediated its degradation and attenuated MaERF113-mediated transactivation of target genes. *MaSINAT5*-overexpression delayed fruit ripening, whereas *MaSINAT5*-silencing accelerated it. Interestingly, MaABI5-like activated and interacted with MaERF113 to enhance the promoter activity of genes involved in starch and chlorophyll degradation. Overall, our findings uncovered a dynamic regulatory module of MaSINAT5/MaABI5-like-MaERF113 mediating ‘Fenjiao’ banana ripening by regulating starch and chlorophyll degradation, which advanced our understanding of site-specific ubiquitination modification and phytohormone crosstalk in regulating fruit ripening.

Keywords: *Musa* spp., fruit ripening, 1-MCP, ripening disorder, transcriptional regulation, ubiquitination modification, signaling crosstalk

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Isolation and Identification of the Main Fungal Pathogens of Peach Fruit and Postharvest Control Methods

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Abstract

Peach fruit with natural disease and decay were collected from different orchards and markets in Zhejiang Province. Then the pathogens were isolated from the diseased spots symptom and identified by morphological characteristics and molecular biological identification (rDNA-ITS sequence analysis). Moreover, pathogenicity test was examined. The antifungal effect of essential oils on the phytopathogens *in vitro* and *in vivo* were also investigated. The results showed that two fungal pathogens with strong aggressiveness were isolated, and identified as *Monilinia fructicola* and *Rhizopus stolonifer*. Essential oils such as tea tree oil (1.4 mL/L) and cinnamon essential oil (0.8 mL/L) inhibited the mycelial growth of *M. fructicola* and *R. stolonifer*. Both essential oils damaged the cell membrane of these fungal pathogens, led to the shriveling of the mycelial mass, as well as plasmalemma wall separation, the ablation and absence of some organelles. Essential oil fumigation could reduce the disease incidence and lesion diameter of brown rot and soft rot of peach fruit caused by these two fungal pathogens. Therefore, the application of tea tree oil and cinnamon essential oil via fumigation presents significant potential for the management of postharvest fungal diseases in peach fruit.

Keywords: Fungal decay, peach, Essential oil, *Rhizopus stolonifer*, *Monilinia fructicola*

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Use of onion aqueous extract in the quality enhancement of fresh-cut potatoes

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Abstract

Fresh-cut potatoes are fresh, nutritious, and convenient to be used and processed, thus become more favored by consumers and industries. However, fresh-cut potatoes are subject to mechanical damages, resulting in enzymatic browning, loss of flavor and nutrients, and ultimately quality deterioration. Thus, maintaining and improving the overall quality of fresh-cut potatoes are of great importance. This study focuses on the effect of onion aqueous extract on the overall quality of fresh-cut potatoes. The fresh-cut potatoes were soaked in 2 g/mL onion aqueous extract for 5 min, and stored at 4 ± 1 °C and 90% relative humidity for 4 d. The results showed that the onion aqueous extract effectively controlled browning in fresh-cut potatoes during storage by inhibiting the activities of browning-related enzymes (e.g., polyphenol oxidase (PPO) and peroxidase). The onion aqueous extract showed a non-competitive inhibition for potato PPO, and the highest percent of inhibition ($75.32 \pm 0.73\%$) was found when PPO catalyzed the oxidation of catechol. Sulfur-containing compounds, 2-mercaptophenol and 4-mercaptophenol were identified in the onion aqueous extract and shown to inhibit PPO activity. Their inhibition of PPO was non-competitive and uncompetitive, respectively. A molecular docking also indicated these two compounds spontaneously bound PPO via hydrogen bonding and hydrophobic interactions. Furthermore, the onion aqueous extract also slowed down the loss of ascorbic acid, increased the contents of γ -aminobutyric acid, total phenols and flavonoids, thus improved the nutritional quality of fresh-cut potatoes. GC-IMS analysis showed that the onion aqueous extract treatment enriched the flavor of stir-fried potatoes. This is due to more volatile organic compounds identified after the onion aqueous extract-treated potatoes was cooked. Such treatment gave enriched flavors (e.g., pungent green vegetable, floral, herbal, wine) of processed potatoes.

Keywords: plant extract, fresh-cut, potatoes, quality, processing flavor

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Synergistic Effects of Controlled Atmosphere Storage and Plant Oil-Based Coating for Extending Fruit Storage Life

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Mohamad Fikri Abdul Hamid¹, Ahmad Azfar Mohamad Areff¹

Abstract

Jackfruit (*Artocarpus heterophyllus* Lam., cv. J33) is an emerging tropical fruit crop in Malaysia, cultivated on 9,611 ha with an annual production of 41,833 MT. Although smaller in scale compared with durian, banana, and pineapple, jackfruit has strong potential for export diversification, with 6,087.6 MT exported in 2023. With a self-sufficiency ratio of 109.4%, domestic demand is secure; however, sustainable growth depends on accessing distant markets. A major constraint is the short storage life of fresh fruit, typically only two weeks under conventional cold storage, which restricts sea shipment. Losses are largely caused by *Lasiodiplodia theobromae* infection and rapid ripening associated with high respiration and ethylene production. For long-distance export, a minimum of three weeks storage plus additional holding time is required. This study examined the combined effects of controlled atmosphere (CA) storage (Daikin Active CA technology) and a plant oil-based coating (EONature®, developed by MARDI) on extending jackfruit storage life at 12 °C. Fruits were subjected to four treatments: cold storage (T1), coating plus cold storage (T2), CA storage (T3), and CA combined with coating (T4). After three weeks, T1 fruits developed disease and ripened within three days at ambient conditions, limiting storage to two weeks. T3 delayed ripening more effectively than T2, though both showed similar disease incidence. Individually, CA or coating extended storage up to four weeks while maintaining normal ripening. The combined treatment (T4) was most effective, preserving quality for four weeks in CA plus an additional two weeks in cold storage, simulating post-arrival handling, for a total storage potential of six weeks. The findings confirm that while CA and coating alone are beneficial, their integration provides synergistic effects, significantly extending storage life without compromising quality. This combined approach offers a safe, practical solution for enabling sea shipment of Malaysian jackfruit to distant markets, thereby strengthening export competitiveness and long-term industry sustainability.

Keywords: ripening, respiration, low-oxygen, quality, export

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Abstract Poster Presentation

Effects of 1-Methylcyclopropene as Ethylene Inhibitors on Extending Storage Times of Pink Cosmos Edible Flowers for Decorative Purposes

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and Panupon Hongpakdee¹

Abstract

This study aimed to extend the vase life of pink cosmos edible flowers for decorative purposes by applying 1-Methylcyclopropene (1-MCP) in different treatments. A completely randomized design (CRD) was employed with four concentrations of fumigated 1-MCP: 0, 1, 10, and 30 ppm into the cosmos edible flowers (*Cosmos bipinnatus* Cav.) for 24 hours. After treatment, six cosmos flowers were arranged per package for each experimental treatment. A total of five replications were prepared for each treatment, with one box representing a single replication. All samples were stored at 7 ± 1.4 °C and 80% relative humidity to evaluate subsequent changes in physical attributes and visual quality. The results revealed that 1-MCP significantly reduced percentage of initial fresh weight loss in the flowers. Increasing the concentrations of 1-MCP from 0 to 30 ppm decreased the percentage of fresh weight change in each treatment throughout storage periods. However, weight loss gradually increased in all treatments over the 3 day storage period, with the lowest weight loss observed in flowers fumigated with 30 ppm 1-MCP. In addition, color analysis (L^* , a^* , b^* , and Hue angle) indicated that fumigation with 1-MCP at concentration 10 ppm resulted in the highest L^* value (lightness, 73.31) on day 2, and the highest Hue angle (113.24°) on day 3. These findings suggest that 1-MCP treatment effectively reduces fresh weight loss and maintains quality in *Cosmos* edible flowers during short-term storage.

Keywords: edible flower, storage condition, ethylene inhibitors, cosmos

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Effect of Sealed HDPE Bag on Postharvest Quality of Sacred Lotus (*Nelumbo nucifera* Gaertn.) after During Cold Storage

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Abstract

The sacred lotus ('Pattama') is highly valued for its attractive coloration and pleasant fragrance. Its petal is used for making traditional snacks (Miang Bua Luang) and lotus tea. However, Lotus has a short shelf life, with common postharvest symptoms including petal bluing (purple discoloration) and blackening of the petal edges. Low temperature and modified atmosphere can extend the shelf life. Moreover, High-Density Polyethylene (HDPE) plastic bags have been reported that maintain postharvest quality and readily available for commercial use. Therefore, the aim of this research was to study effect of sealed and unsealed HDPE bags on the quality of sacred lotus. The lotus with a bud opening of 0.2–1.5 cm was harvested from a farm. They were packed in foam box and covered with wet cloth and transported to the laboratory. Each flower stem was recut to 2 cm, after that the stem was wrapped with cotton moistened with reverse osmosis water, then covered with aluminum foil. Flowers were divided into 3 treatments: (1) control; flowers were packed in 1000 ml plastic box (commercial method), (2) and (3) flowers were packed in sealed and unsealed HDPE plastic bag (6x9 inches) before being placed packed in 1000 ml plastic box, respectively. All flowers were stored at 10°C. Bluing and blackening score of outer petals (1= no symptom to 5 = visible symptom > 40% of total area), and petal color change were recorded. After 12 days at 10°C, flower exhibit bluing and blackening on more than 30% of total area. Petal color analysis showed that lotus flowers stored in sealed HDPE bags had the highest L* value at the petal center (59.80), while L* values at the petal tips did not differ significantly among treatments. Flowers placed in sealed bag, unsealed bag and control exhibited the bluing scores of 2.83, 4.17 and 4.83 points, respectively, whereas, blackening did not differ significantly among treatments. These results indicate that sealed HDPE bags were effective in reducing bluing in sacred lotus flowers, but it had no significant effect on blackening after storage at 10 °C

Keywords: bluing, blackening, edible flower, modified atmosphere

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Steam blanching preserves postharvest quality and functional compounds in tamarind (*Tamarindus indica* L.) pulp

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Abstract

This study evaluated the influence of steam blanching at 60 °C for 10, 20, and 30 min on browning and physicochemical properties of tamarind pulp stored at 25 °C for 49 days. Blanching effectively suppressed polyphenol oxidase activity (PPO) and reduced reducing sugars, delaying enzymatic and Maillard browning, as reflected in delayed 5-Hydroxymethyl-2-furfural (HMF) formation. Blanched tamarind pulp samples exhibited darker but more stable color, slightly higher water activity (a_W) within safe limiting microbial growth and preserved ascorbic acid and total phenolic content. Unblanched controls showed higher PPO activity, greater HMF accumulation, and postharvest increases in phenolics. The findings provide guidance for postharvest processing strategies that balance enzymatic suppression, non-enzymatic browning, and functional compound retention.

Keywords: steam blanching, sour tamarind, browning reaction, maillard reaction, storage stability

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Hypobaric cold storage delays post-harvest quality deterioration of Chinese bayberry fruit

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Abstract

Chinese bayberry (*Morella rubra*) is a subtropical evergreen fruit tree with a bright appearance, unique taste, and rich nutrition. However, the absence of a protective skin in Chinese bayberry fruit makes them highly vulnerable to mechanical damage and the proliferation of pathogenic microorganisms, thereby leading to a rapid decline in fruit quality shortly after harvest. Traditional preservation methods have limited effectiveness in extending the storage time of Chinese bayberry fruit. Recently, hypobaric cold storage has shown significant advantages in fruit quality control by combining physical preservation methods such as low temperature, depressurization, and controlled atmosphere. However, there are few reports on using hypobaric cold storage to delay post-harvest quality deterioration in Chinese bayberry fruit. In this study, we selected different varieties of Chinese bayberry fruit from different origins for experiment, including 'Biqi' and 'Dongkui' (cultivated in Shiping, Yunnan), and 'Zaojia' and 'Biqi' (cultivated in Lanxi, Zhejiang). Compared with control storage, hypobaric cold storage (-30 kPa, applied every 3 days, at 0 °C and 85-90% humidity for 6 weeks) significantly reduced the fruit decay rate, and delayed the decline in firmness and in antioxidant enzyme activity. Moreover, hypobaric cold storage limited ethanol and acetaldehyde accumulation while maintaining higher terpene levels, thus reducing flavor loss. As a result, hypobaric cold storage could maintain commercial quality of Chinese bayberry fruit for two weeks. Our research provides new insights into extending the taste period of Chinese bayberry fruit.

Keywords: *Morella rubra*, controllable storage conditions, fruit quality, antioxidant enzyme activity

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‘Carabao’ Mango Fruit Quality and Antioxidant Activity as Influenced by Fruit Bagging and Harvesting at Later Maturity Stage

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Abstract

The Philippines plays a major role in the global mango trade but struggles to deliver consistent fruit quality due to pests, diseases, and poor practices. This study compared Taiwan paper bag (TPB) with conventional newspaper bagging at different bagging times (56–57 or 74–75 days after flower induction, DAFI) and harvest maturity (113–114 or 118–119 DAFI). Bagging at 74–75 DAFI resulted in higher fruit retention (89%) compared to early bagging (37%). TPB also produced more export-quality mangoes, particularly Hong Kong grade (16.2% vs. 8.5%), and reduced preharvest defects such as growth cracks, scab, and fruit fly infestation. After harvest, mangoes bagged with TPB at 74–75 DAFI and harvested at 113–114 DAFI exhibited better visual quality, lower incidence and delayed onset of diseases, and longer shelf life (9 days). The mangoes also showed higher titratable acidity, total phenolic acid, ascorbic acid, and antioxidant activity. Fruit bagging with TPB at 74–75 DAFI followed by harvesting at 113–114 DAFI is a promising strategy to minimize pre- and postharvest losses while extending fruit quality and enhancing nutritional value.

Keywords: ascorbic acid, delayed bagging, harvest quality, total phenolic acid, antioxidant activity

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Evaluation of Fruit Size and Shelf Life Quality in Mango (*Mangifera indica* L.) Varieties ‘Bao’ and ‘Pimsaen Bao’ as a Basis for Harvest Index Development

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Abstract

A reliable harvesting index is essential for maintaining fruit quality and reducing postharvest losses in mangoes destined for processing, such as pickled green mangoes. Information on the postharvest performance of mango varieties ‘Bao’ and ‘Pimsaen Bao’, however, is still lacking. This study evaluated the effect of fruit size at commercial maturity (unripe stage; 50 days after blooming) on postharvest life in both varieties. The fruit size of ‘Pimsaen Bao’ mango was classified into four groups: N1 (8.53 × 4.96 × 4.22 cm), N2 (7.55 × 4.45 × 3.92 cm), N3 (6.89 × 4.15 × 3.71 cm), and N4 (6.21 × 3.62 × 3.31 cm). ‘Bao’ mango was classified into five groups: N1 (5.39 × 4.48 × 3.52 cm), N2 (4.75 × 4.48 × 3.42 cm), N3 (4.30 × 4.17 × 3.18 cm), N4 (4.33 × 3.88 × 3.10 cm), and N5 (3.72 × 3.52 × 2.79 cm). Fruits were assessed for weight loss and peel color (L^* , a^* , b^* hue angle) during 7 days of storage at ambient temperature (31±1°C and 83% relative humidity). Postharvest life was defined as the time required for fruit to reach 15% cumulative weight loss, beyond which they were considered expired. The results showed that smaller fruit sizes (N4 in ‘Pimsaen Bao’ and N4-N5 in ‘Bao’) reached this limit significantly earlier ($p<0.05$) than larger fruits. Larger sizes (N1-N2) exhibited lower weight loss for a longer period, indicating better suitability for storage and handling. Peel color parameters showed no significant change in either variety, confirming that coloration is not a reliable indicator of harvest index in these green mango types. These findings demonstrate that fruit size has a strong influence on postharvest life, with larger fruit being more suitable for long-distance distribution and processing. This study provides the first evidence on the postharvest life characteristics of these local mango varieties and establishes a weight-loss threshold that may serve as a practical reference for postharvest quality.

Keywords: mango, postharvest loss, weight loss threshold, green-mango type, processing suitability

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From Bruise to Breakdown: Multi-Omics of Transport-Induced Deterioration in Apples

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and Saowapa Chaiwong³, Xue An⁴

Abstract

Mechanical damage during express transportation is a major cause of postharvest quality loss in fresh produce. We integrated physiological and biochemical assays with microscopy and multi-omics to characterize the consequences of transport-induced stress in apples. Mechanical injury produced a fruit damage index of 0.18 and an overall damage rate of 18%, with the calyx end most susceptible. Microscopy and FTIR confirmed cell wall collapse, polysaccharide depolymerization, and exposure of functional groups. Biochemical assays showed accelerated wall disassembly, including a 140.9% increase in pectin solubilization and a 91.2% rise in cellulase activity, along with intensified lipid peroxidation (52.7% increase in MDA) and enzymatic browning (93% increase in PPO). Non-targeted metabolomics revealed broad metabolic reprogramming, including stress-related phenolic accumulation, inhibition of tryptophan metabolism, and disruption of lipid-derived signaling. Mechanical stress also reshaped the epiphytic microbiome, shifting from protective *Bacillus* to spoilage-associated *Metchnikowia* yeasts with strong pectinolytic capacity. Across scales from macroscopic traits to microscopic structure, physiological responses to molecular pathways, and host tissues to microbial communities, this study clarifies the synergistic mechanisms driving quality deterioration in apples. These insights provide a foundation for strategies to reduce postharvest losses and enable precision quality control.

Keywords: apple fruit, cell wall degradation, mechanical damage, quality deterioration, tissue metabolism

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The C2H2-GGAT Regulatory Module Fine-Tunes Glutamate Homeostasis to Improve Fruit Flavor and Enhance Disease Resistance in Peach

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Abstract

Free amino acids (FAAs) play a fundamental role in determining fruit quality and stress adaptation, yet their genetic regulation remains poorly understood. Through an integrated approach combining metabolomic and sensory analyses of 120 peach (*Prunus persica*) hybrids, we identified glutamate as a key metabolite linking FAA content to umami taste perception. By combining genome-wide association studies (GWAS) with expression quantitative trait locus (eQTL) mapping, we identified *PpGGAT1* (glutamate:glyoxylate aminotransferase) and the zinc finger transcription factor *PpC2H2-3* as central regulators of glutamate metabolism. Functional characterization revealed that overexpression of *PpGGAT1* led to reduced glutamate levels and diminished umami intensity, whereas *PpC2H2-3* transcriptionally suppresses *PpGGAT1* to enhance glutamate accumulation. Five microliters of the *M. fructicola* spore suspension, at a final concentration of 5×10^5 spores/mL, was inoculated into a small wound on the equatorial region of each fruit. Notably, elevated glutamate levels enhanced resistance to *Monilinia fructicola* infection, with both genes showing significant expression changes during the progression of brown rot disease. Comparative analysis further indicated that freestone cultivars exhibit superior glutamate accumulation, a trait confirmed across 30 commercial varieties. Our findings reveal a novel regulatory module, *PpC2H2-3-PpGGAT1*, that coordinately modulates fruit flavor quality and defense responses against pathogens. This study provides mechanistic insights into FAA regulation in fruit crops and identifies actionable molecular targets for the development of varieties with enhanced sensory attributes and disease resistance.

Keywords: peach, amino acids, fruit quality, brown rot disease

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Auxin - Ethylene Crosstalk Modulates Postharvest Softening and Ripening in Peach Fruit

Yanyan Sun^{1*}, Yanna Shi¹, Kunsong Chen¹

Abstract

Melting flesh (MF) peach fruit (*Prunus persica* L. Batsch) cultivars produce high levels of ethylene during postharvest, driven by elevated auxin concentrations. This leads to rapid fruit softening during the late developmental stage. Although auxin is known to mediate this softening process by regulating the expression of the ethylene synthesis gene *PpACS1*, the underlying transcriptional regulatory network remains poorly characterized. In this study, we demonstrate that auxin orchestrates a sophisticated transcriptional network of *PpACS1*. It induces multiple transcription factors, including PpHAT14, PpWRKY40, and PpNAC74, to interact with a central transcription factor PpERF61, thereby forming a regulatory hub that synergistically controls *PpACS1* expression and fruit softening. This cooperative mechanism ensures the efficient regulation of auxin-induced peach fruit softening, providing new insights into the hormonal regulation of peach texture.

Keywords: peach, auxin, ethylene, softening, co-regulation

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Study on The Function of Tomato *SLCSLA2* and its Regulation Mechanism on Fruit Softening

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Abstract

The texture of fleshy fruit is one of the important quality characteristics. Softening improves taste and enhances overall attractiveness, but excessive softening is not conducive to post harvest storage and transportation. Softening is a biological process of cell wall remodeling, involving pectin dissolution, hemicellulose depolymerization, reduced cell adhesion, and so on. Previous studies on fruit softening have mostly focused on cell wall degrading enzymes. This study discovered a mannan synthase *SLCSLA2* and knocked it out in tomato through CRISPR/Cas9, resulting in a significant increase in fruit firmness and which was maintained at a certain level after harvesting. In addition, other traits such as plant morphology and fruit development were not affected. In summary, the regulation of fruit softening by *SLCSLA2* can provide a new path for exploring cell wall remodeling and a new approach for improving the storage and transportation of fruit after harvest.

Keywords: tomato, fruit softening, mannan synthase, cell wall remodeling

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Flavonol Biofortification in Tomato Extends Postharvest Shelf Life and Improves Resistance against *Botrytis cinerea*

Ruining Zhang^{1*}, Yunlin Cao¹, Ruohan Ou¹, Bo Zhang¹, Kunsong Chen¹ and Xian Li¹

Abstract

Flavonols play crucial roles in regulating plant growth and promoting stress resistance. They are also important dietary components due to their benefits for human health. However, flavonol levels in consumed horticultural crops are insufficient to provide optimal benefits, and their role in regulating postharvest storage in fruit remains unclear. In this study, overexpression of *MrMYB12* or *MrMYB12/MrF3'5'H* from *Morella rubra* in tomato plants (*Solanum lycopersicum*) resulted in high accumulation of flavonols in fruit up to 3.2 mg/g by up-regulating expression levels of genes involved in flavonol biosynthetic pathway. The transgenic tomato fruit showed high free radical scavenging activities including 1,1-diphenyl-2-picrylhydrazyl (DPPH), ferric ion reducing antioxidant power (FRAP) and 2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) as well as excellent inhibitory effects against α -glucosidase. Postharvest storage experiments showed flavonol-rich fruit exhibited long shelf life with less surface shrinkage and high antioxidant activity. Also, flavonol-rich fruits enhanced resistance against *Botrytis cinerea*, which was associated with increase of antioxidant enzyme activities and up-regulation of defense-related genes. This study provides new insights for improving nutritional value, extending postharvest shelf life and enhancing pathogen resistance of horticultural crops by metabolic engineering.

Keywords: flavonol, MYB12, F3'5'H, postharvest storage, pathogen resistance

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Wide Profiling Reveals that HDA1 Regulates Tomato Fruit Ripening through Targeted -Genome Histone Deacetylation

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Abstract

Histone acetylation is a dynamic and reversible epigenetic modification. Acetylation mediated by histone acetyltransferases (HATs) generally promotes transcriptional activation, whereas deacetylation catalyzed by histone deacetylases (HDACs) leads to transcriptional repression. Accumulating evidence indicates that HDACs exert broad regulatory functions during fruit development and ripening. Although HDA1 has been wide transcriptional repression role and the chromatin-implicated in tomato fruit ripening, its genome modification states of its direct target genes remain poorly characterized. In this study, we generated HDA1 knockout mutants using CRISPR/Cas9 and confirmed their phenotype through genetic complementation. CRISPR mutants exhibited significantly accelerated ripening, maturing -Phenotypic analysis revealed that HDA1 type fruit. Further molecular profiling indicated that loss of HDA1 did -approximately 8 days earlier than wild not induce global changes in histone acetylation but specifically elevated acetylation levels at promoter and gene body regions of upregulated genes. Notably, no significant changes were detected in the repressive mark H3K27me3, either globally or locally at these activated genes. Mechanistic investigations demonstrated that tuning their acetylation levels. These -related genes by fine-HDA1 modulates the expression of key ripening ,*PG2a* cell wall degradation gene ,*PSY* carotenoid metabolic gene ,*ACS2* include the ethylene biosynthesis gene as well as critical transcription factors NOR and RIN. Our ,*DML2* DNA demethylase ,*LOXC* lipid metabolism gene results underscore that HDA1 plays an essential role in tomato fruit ripening through precise spatial control of .histone acetylation at specific genomic loci

Keywords: histone acetylation, HDA1, tomato, ripening

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Enhancing Postharvest Quality to Support Emerging Tomato Growers in Tak Province

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and Anjana Bhunchoth¹

Abstract

Tomato is a food crop cultivated extensively for their edible and nutrient-rich fruit. It can be consumed fresh, used in cooking, and processed into various products. Two cherry tomato cultivars, Red Ruby and Sunshine were introduced into local communities in Tak province. To assist growers in harvesting at the correct stage, postharvest characteristics, including fresh weight, firmness, TSS, and colour, were determined at five stages during ripening. The results indicated that tomato fruits of both cultivars at ripe and overripe stages can be harvested for personal consumption with its high TSS, a* value and fresh weight. For commercialization, the tomato at the colour break 2 stage was suitable. Between two cultivars, Red Ruby was firmer and sweeter than Sunshine.

Keywords: tomato, postharvest, ripening, senescence, color

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Spirogyra Residue-Based Edible Coating for Maintaining Postharvest Quality and Safety of Tomatoes

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Chananya Chuaysrinule¹ and Thanapoom Maneeboon¹

Abstract

Tomatoes are perishable and prone to postharvest deterioration, leading to quality and safety losses. This study aimed to evaluate the potential of a *Spirogyra* residue-based coating (SRC) as a natural treatment for maintaining the postharvest quality of tomatoes during storage at 4 °C and 25 °C for 21 days. Tomato samples were coated with the prepared SRC solution, whereas control samples were treated with distilled water. The results showed that at 4°C, SRC-coated tomatoes exhibited lower weight loss, maintained firmness, and reduced microbial growth compared to the control samples. At 25°C, the coating also delayed ripening and minimised spoilage, although quality changes occurred more rapidly than at 4°C. The coating effectively inhibited microbial proliferation, particularly total plate count, yeast and mold, while mitigating physical deterioration such as colour, firmness, and weight loss. These findings demonstrate that SRC can effectively delay physical changes and prevent microbial growth, thereby extending the postharvest quality of tomatoes.

Keywords: tomato, *Spirogyra* residue, coating, postharvest quality, food safety

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Local in-Transit Handling Trial of ‘Puyat’ Durian (*Durio zibethinus* L.) Fruit from Davao City to Laguna, Philippines

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Abstract

A handling trial from Davao City to Laguna in the Philippines was conducted to evaluate the effects of a commercial paraffin-based wax as a surface coating (10 and 20% Decco Lustr 444 Wax, DLW) of ‘Puyat’ durian packed in corrugated boxes with dividers on its postharvest quality. DLW was uniformly brushed twice onto the entire husk and peduncle using about 50 mL of the wax per fruit. After air-drying and packing, durian fruit were loaded into a wing van truck that regularly transports other fruit via land transit for 1,503 km which took approximately four days to Laguna (30.2±1.7°C, 83.4±7.6%RH). Durian boxes were placed at the top of the pile with mango boxes in the middle and bottom levels. Both surface coating concentrations reduced weight loss compared to uncoated fruit, although disease severity increased rapidly in 10% DLW-coated fruit at 8 days after treatment. DLW coating delayed physicochemical changes associated with ripening, including spine pliability, hollow sound, and presence of aroma, while maintaining pulp firmness, color, and ascorbic acid content. Respiration (CO₂) and ethylene levels were also suppressed in coated fruit, with the onset of capsule splitting of 10% DLW-treated fruit delayed by two days relative to uncoated fruit. Total phenolic content slightly declined in coated fruit, but ascorbic acid retention was higher than in uncoated fruit. Results indicate that 10% DLW coating of fruit packed in corrugated box with dividers, can serve as a practical postharvest handling strategy for durian during local transport, though disease management remains essential.

Keywords: Decco Lustr wax, durian fruit, transport trial, surface coating

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Design and Development of an Acoustic-Based Mobile Application for Non-Destructive Postharvest Durian Ripeness Assessment

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Abstract

Durian (*Durio zibethinus*) is a highly sought-after fruit in Southeast Asia, with growing demand for fruit that offers the best eating quality in terms of aroma, texture, and flavor. However, assessing ripeness at the consumer level remains challenging, as traditional methods rely mainly on subjective judgment based on appearance, odor, and sound. Inaccurate evaluation of ripeness often results in durians being sold before reaching optimal eating quality or after exceeding it, leading to unsatisfactory flavor and texture. Ensuring accurate ripeness assessment is therefore essential to maintain consumer satisfaction and market confidence in durian quality. This study introduced a mobile application designed for the postharvest evaluation of durian ripeness, employing artificial intelligence to automate the classification process. The system utilized Short-time Fourier Transform (STFT) for audio feature extraction from tapping sounds, which were then analyzed using a Convolutional Neural Network (CNN). The model was trained on samples of unripe and midripe durians, achieving an accuracy of 86.43% and a precision of 87.20%. The proposed application provides a rapid and efficient tool for traders and consumers, minimizing reliance on manual inspection while enhancing the accuracy of ripeness evaluations.

Keywords: 'Puyat' durian, ripeness evaluation, audio classification, spectrogram, artificial intelligence, and machine learning

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Tasting with Algorithms: AI for Mango Flavor Identification

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Abstract

As one of Thailand's most important agricultural exports, mangoes play a vital role in the economy. However, consumers often struggle to distinguish varieties by flavour, particularly in the unripe stage. This study explores the use of a convolutional neural network (CNN), based on the Xception model to predict, by identification, mango flavor based on species and ripeness. This study focuses on the unripe stage of mangoes because at this point, the skin remains predominantly green and the fruit has not yet developed the yellow or orange internal or external colouration typical of ripeness, making it difficult to distinguish between varieties or individual fruits that will become savoury from those that will become sour. The dataset of 236 images of mangoes includes eight common Thai varieties, all sampled at the unripe (green) stage. These were grouped into two flavour categories traditionally described as savoury (Falan, Kaew Khamin, Khiew Sawoey and Mun Salaya) and sour (Bao, Kaew, Nam Dok Mai and Ok Rong). The pictures in each category were randomised and the train:test:validation ratio is 4:1:1. The model was developed using Python on Google Colab and trained over 25 epochs, achieving a training accuracy of 98.26%, validation accuracy of 67.44%, and test accuracy of 88.89%. The proposed model is based on the pretrained Xception architecture with the fully connected top layers removed (include_top=false). A GlobalAveragePooling layer followed by a 256-unit ReLU dense layer and a 2-unit Softmax output layer were added for binary classification. The convolutional layers of Xception were frozen to utilize pretrained ImageNet features, and the network was trained using the Adam optimizer and categorical cross-entropy loss. The dataset was split into 66.8% training, 16.8% validation, and 16.4% testing. A hold-out validation method was used to assess model performance during training. Despite the limited number of images per class, data augmentation was employed to improve generalization and reduce overfitting, enabling robust classification performance. The most frequent error was confusing savoury for sour mangoes. Although the dataset size is limited, all images were selected from publicly available online sources to ensure sufficient variability and representativeness. This helps provide a variety of examples, though some data lack high image quality. Despite the limited dataset, this system provides a cost-effective tool to assist farmers with harvest timing, improve post-harvest sorting, ensure product consistency, and reinforce Thailand's global mango export competitiveness.

Keywords: postharvest quality assessment, web-based tool, feature extraction, image processing, remove background