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Editorial

Special Issue: 'Preharvest and Postharvest Factors Improving Horticultural Crops Quality and Shelf-Life'

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1. Introduction

Although fresh horticultural crops are rich in nutrients and various biologically active chemicals, they are also perishable. During the pre- and postharvest periods, fresh horticultural products inevitably suffer from quality deterioration and decay [1]. Especially in developing countries, approximately one-third of fresh horticultural products are lost during the postharvest storage and marketing processes and do not reach consumers' tables [2]. Decay not only causes economic losses, but also produces mycotoxins that accumulate in fresh horticultural products, which is a serious threat to consumer health [3]. Effective pre- and post-harvest techniques play a key role in improving the quality of fresh horticultural products [4]. The aim of this Special Issue is to provide readers with a more in-depth understanding of preharvest and postharvest factors that affect the postharvest quality, disease, ripening and senescence, and shelf life of horticultural crops, which could better serve the horticultural industry. After a rigorous review, a total of thirteen articles (two review papers and eleven research papers) are included in this Special Issue, which examines and discusses field management and pre- and postharvest treatments, as well as proposing new methods to improve the quality and shelf life of various fresh horticultural products.

2. Overview of Published Articles

2.1. Internal Factors Affecting the Quality of Horticultural Crops

Variety and maturity are important intrinsic factors affecting the quality of fresh horticultural produce [1]. Ayuso-Yuste et al. (contribution 1) cultivated five traditional tomato varieties and one commercial variety under organic conditions. The results show that traditional varieties have higher contents of total soluble solids (TSSs), titratable acidity, vitamin C, lycopene, β-carotene, and bioactive compounds during ripening. Zou et al. (contribution 2) harvested *Akebia trifoliata* fruits at four stages of maturity and found that fruit size increased and firmness decreased during ripening. Moreover, the accumulation of TSS, fructose, glucose and ascorbic acid content and the decrease in total phenolic and total flavonoid levels in the fruit occurred during ripening. Therefore, *A. trifoliata* fruits harvested at 148 days after full bloom had the best quality and longest shelf life.

2.2. External Factors Affecting the Quality of Horticultural Products

2.2.1. Field Management

The development period is critical for the formation of postharvest quality and resistance in fresh horticultural products. Light, irrigation, soil, and fertilization affect the quality of horticultural products in terms of photosynthesis, respiration, and nutrient content [5]. Photosynthesis is the process by which plants use captured light energy for photochemical reactions and carbon assimilation, which is the basis for crop yield and quality formation [6]. Nadeem et al. (contribution 3) demonstrated that on-tree fruit bagging and 10-day cold storage maintained the postharvest quality of 'Samar Bahisht

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Chaunsa' mango fruit, including its firmness, TSSs, vitamin C and total phenolic content, and antioxidant activity. Major et al. (contribution 4) showed that the application of a plant cover increased the dry matter, starch, and sugar contents of 'Early' potato varieties. In addition, the potato tubers harvested from the covered plants showed a similar sensory quality after oil frying compared to potatoes without the cover. Soil moisture status also affects the quality of fresh horticultural crops, and the proper irrigation of arable land is conducive to the coordination of soil water, fertilizer, gas and heat, thereby improving the quality of fresh horticultural crops [7]. Melero-Meraz et al. (contribution 5) showed that supplemental irrigation increased fruit yield, fruit mass, and the proportion of 'Roja Lisa' cactus pears. Moreover, the irrigation treatment reduced fruit mass loss at harvest and during storage.

2.2.2. Preharvest Treatments

Preharvest chemical spraying can significantly improve the postharvest quality of horticultural products. Compared with postharvest treatment, preharvest chemical spraying during the development period is simple, which is more conducive to the application in production practice. Preharvest spraying can not only solve the problems encountered after harvest, but also play a key role in the growth and development of crops, field disease control, and postharvest quality. The spraying has a more pronounced effect [8,9]. Zhu et al. (contribution 6) showed that plants of 'Longshu No.7' potato sprayed with 3% chitosan before harvest had enhanced phenylpropanoid metabolism and an accelerated accumulation of suberin polyphenols and lignin. Moreover, periderm formed in the wounds of potato tubers, thus improving their postharvest quality. Ziogas et al. (contribution 7) demonstrated that foliar spraying with a Si-Ca-based product delayed maturation, maintained postharvest quality, and reduced decay during the storage of 'Clementine' mandarins. Gong et al. (contribution 8) found that preharvest spraying with a chemical elicitor delayed ripening and maturity and maintained the postharvest quality of fruit. Moreover, the spray improved the antioxidant activity of the harvested fruit by enhancing the antioxidant system. In addition, the spray maintained cell membrane integrity, thereby reducing the chilling injury of harvested fruit during cold storage.

2.2.3. Postharvest Treatments

After harvest, the quality of fresh horticultural crops deteriorates with ripening/ripening and senescence, and undesirable metabolic changes occur in response to storage environments, including softening, uneven color, and a loss of flavor and nutrients [10]. Although these physiological and biochemical changes cannot be stopped, appropriate postharvest measures and improved storage conditions help to delay ripening and senescence, maintain postharvest quality, and extend the shelf life of fresh horticultural crops during storage. Sortino et al. (contribution 9) showed that coating fresh-cut 'Hayward' kiwifruits with mucilage from *Opuntia ficus-indica* and *Aloe arborescens* delayed fruit ripening and maintained appearance and texture. The coating also maintained TA and TSSs, reducing weight loss and microbial activity. In addition, the coating extended the shelf life of fresh-cut kiwifruit. Vilvert et al. (contribution 10) demonstrated that chitosan–graphene–oxide-based biodegradable packaging could delay ripening and maintain the postharvest quality of 'Tommy Atkins' mangoes during cold storage. Moreover, the packaged fruit demonstrated higher levels of ascorbic acid, yellow flavonoids, phenolic compounds, and antioxidant activity. Choi et al. (contribution 11) found that chlorophyll fluorescence changes during fruit ripening and can be used to classify the ripening stages. Tomatoes stored in the dark at 20–15 °C (day–night) had delayed ripening. However, tomatoes stored at 30–20 °C (day–night) with a light intensity of 400 $\mu mol \cdot m^{-2} \cdot s^{-1}$ showed greater accumulation of sugar, phenolics and lycopene, and higher levels of antioxidant activity. Dogan et al. (contribution 12) showed that the atmospheric composition of 3% O_2 + 15% CO_2 effectively delayed the ripening of fresh 'Bursa Siyahi' fig by reducing the respiration rate and ethylene production during 28 d of storage at 0 °C. Moreover, the treatment maintained the firmness, as well as the sugar and organic acid contents, of fig fruits and prevented decay caused by microorganism growth. Subroto et al. (contribution 13) reviewed microbiological activity in the postharvest handling of cocoa beans, particularly in the fermentation process. In addition, the effect of microbial activity on the physical and chemical properties of cocoa beans was concluded. They also demonstrated that fermentation control is critical to improving the postharvest quality of cocoa beans.

3. Conclusions

These articles, which are written to a very high standard with excellent citations, were selected from a large number of submissions through rigorous evaluation and. This Special Issue strives to promote more in-depth communication among professional and technical personnel in the field of horticultural postharvest studies, improving postharvest quality, ensuring product safety, and serving the healthy development of the horticultural industry.

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