horticulturae

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Editorial

Improving Quality of Fruit

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Fruits are necessary for a balanced diet, and they are consumed for their vitamins, fiber, and other beneficial compounds. The most appealing characteristics of fruits are the sensory traits such as flavor, texture, aroma, color, and several bioactive phytochemicals. Therefore, a better understanding of fruit ripening mechanisms is required to improve their quality. Fruits are classified based on climacteric and non-climacteric respiration bursts during postharvest storage. Both types of ripening can affect the quality of fruits in various ways during on-tree development and the postharvest period. The goal of this Special Issue, entitled 'Improving Quality of Fruit', is to examine the molecular mechanisms and recent advances in horticultural practices that are related to fruit quality. For instance, preharvest foliar applications, postharvest handlings, and storage conditions. The current Special Issue compiles seven original research articles and one review article focusing on the quality of fruits and seeds.

Postharvest physiological disorders unfavorably influence the quality of fruits. Hardened pears are an important physiological disorder by which lignin accumulates in fruits [1]. To study hardened fruits, 'Suli' pears (*Pyrus bretschneideri* Rehd) were used from normal and hardened fruits during different developmental stages of fruit. At an early stage, a transcriptome analysis approach was applied to examine the molecular mechanism of fruit hardening. The authors showed that hardened fruits from the top rather than the shoulder region of the pear tree possessed a prominently higher lignin level than normal fruits, within 35–180 days after flowering. Subsequently, transcriptome analysis of fruits at 35 days after anthesis identified 4391, 3849 and 408 differentially expressed genes (DEGs) when comparing fruits from the hardened shoulder region vs. those from the normal top region, fruits from the hardened top region vs. those from the normal top region, and fruits from the hardened top region vs. those from the hardened shoulder region, respectively. They detected 26 genes that encode 10 enzymes as candidate genes participating in lignin biosynthesis. Moreover, transcription factors were evaluated regarding their involvement in lignin formation. Finally, they observed that the genes expression participating in flavonoid/proanthocyanidin biosynthesis was decreased in fruits from the hardened top region, suggesting a possible metabolic shift in the flavonoid metabolic pathway to the lignin biosynthetic pathway. This study lays a theoretical foundation and provides data about the mechanism by which lignin accumulates in hardened pear fruit.

Fresh-cut fruits are healthy and convenient snacks or meals that earn the preference of consumers. Pear fruits are known for their high antioxidant and nutritional values, but fresh-cut pears are very susceptible to rapid decay. On the other hand, edible coatings represent a good strategy to maintain postharvest quality, especially in fresh-cut fruits. The work of Passafiume et al. [2] studied the effects of edible coatings in fresh-cut 'Coscia' pears. The edible coatings mainly consisted of Aloe vera gel, and hydroxypropyl methylcellulose plus pomegranate seed oil or not. A decrease in weight loss, firmness, and color has been determined in both edible coatings slides in comparison to control slices. Furthermore, no

Citation: Michailidis, M.; Tanou, G. Improving Quality of Fruit. *Horticulturae* **2022**, *8*, 1194. https://doi.org/10.3390/horticulturae8121194

Received: 6 September 2022
Accepted: 9 September 2022
Published: 14 December 2022

colonies of harmful microorganisms were developed. Finally, the sensory analysis indicated that the edible coatings did not provoke undesirable flavors during the storage period.

Peel of fruits is the physical barrier between the fruit flesh and the environment; additionally, the peel accumulates anthocyanins in response to different stresses. Herein, the nutritional value of peel was studied in four peach cultivars (*Prunus persica* L.), two pear cultivars (*Pyrus communis* L.; *Pyrus pyrifolia* N.), and three apple cultivars (*Malus domestica* Borkh.) [3]. Based on the nutritional traits, there was a clear differentiation among the cultivars and between peeled and unpeeled fruits. An increased antioxidant capacity and content of total phenols and flavonoids was recorded in peaches vs. nectarines, whereas nectarines exhibited higher hydroxycinnamates and dry matter. Regarding the apple cultivars, Granny Smith exhibited a high level of titratable acidity, while the Gala displayed a high level of soluble solids concentration, carotenoids, dry matter, hydroxycinnamic acids, and flavonols in the unpeeled fruit, whereas the Red Chief displayed increased anthocyanins, antioxidant capacity, total phenols, and flavonoids. The beneficial compounds content of Nashi pears with peel was due to the significant contribution of its skin. The peel of the Granny Smith cultivar was associated with an increased level of P, K, Ca, and Mg, whereas that of Red Chief was associated with increased anthocyanins and Mg content.

Thermal insulation covers can minimize temperature fluctuations in cool chain management to reduce postharvest loss and to maintain the quality during storage and transportation [4]. To study thermal insulation covering materials, four covers were tested, namely, metalized Tyvek® (MTyvek), metalized foam sheet (MFS), heat-reflective sheet with thin nonwoven (HRS + TNNW) and thick nonwoven (HRS + TKNW). These covers were compared with perforated linear low-density polyethylene (P-LLDPE) as the typical handing package and no covering as the control. The material properties, transpiration rate, vital heat, temperature profiles, relative humidity, mass loss, and incidence of decay were determined throughout a simulated supply chain for okra. The results displayed that both HRS covers had the lowest thermal heat energy (Qx), maintain low-temperature fluctuation, and had moderate R-value, indicating the lowest mass loss and decay in okra. The HRS + TNNW cover yielded less decay (1%) in okra compared to commercial covers, MTyvek (16%) and MFS (9%). The results exhibited that HRS + TNNW has great potential as a thermal insulation cover to reduce postharvest loss in okra (5%) compared to typical handling (11–18%) and could be considered as alternative material to reduce the use of foam sheets in cool chain management distribution packaging of okra under ambient environment conditions.

Exogenous calcium foliar spray in sweet cherry (*Prunus avium* L.) during fruit development implies a positive effect on fruit quality and ripening attributes such as firmness and cracking susceptibility. However, the effect of applying calcium to dormant buds has not been investigated. In this work, the possible role of an early calcium application via sprays (0.25, 0.5, and 1 M $CaCl_2$) on dormant buds to improve sweet cherry (cv. Ferrovia) fruit quality at harvest was studied [5]. Moreover, sweet cherry quality traits were also investigated in response to the age of spurs and the ripening stage, along with their interactions. The results exhibit that calcium enters the dormant flower buds and the phloem but not the dormant vegetative buds. The levels of microelements Zn, Mn, and Cu were decreased in fruits at harvest. On-tree fruit cracking was lower in red-color (unripe) cherries as well as in fruit that was harvested from 2-year-old short spurs or from Ca-treated buds. Fruit harvested from Ca-exposed spurs exhibited lower levels of ribose, and higher sucrose, maltose, and quininic acid levels. This study displays that a high dose of calcium can effectively improve fruit attributes, in particular calcium content, cracking incidence, and fruit set.

Biochar is produced through pyrolysis or gasification in the absence (or under reduction) of oxygen. It can improve soil physicochemical attributes, and it is resistant against decomposition. In this work, the effects of acidified biochar on mango quality and yield in alkaline soil was investigated [6]. Five levels of biochar, i.e., 0, 5, 10, 20 and 40 tons

per hectare, were incorporated into the soil. The results displayed that 20 and 40 tons per hectare of acidified biochar significantly increased fruit retention, soluble solids concentration, sugar and ash contents of mango. In 40 tons per hectare of acidified biochar, an increase in mango fruit weight and yield was detected. Hence, 40 tons per hectare of acidified biochar is the best treatment to improve the quality and yield of mango fruit in alkaline soils.

In another study, eco-physiological responses to liquid fertilizer of starfish treated with seaweed (SFS) or not (SF) was conducted in organic open-field and greenhouse red pepper cultivations [7]. The levels of pH and salts were monitored for a 16-week period. SF- and SFS-greenhouse plots resulted in increased electrical conductivity, organic matter, and concentrations of total nitrogen, phosphorous pentoxide, potassium oxide, and magnesium oxide, as well as displayed richer bacterial colonies.

Conifers are economically and ecologically important, have a good tolerance to biotic and abiotic stress, and strong survival ability. Seeds of some conifer species, which are used for food and medicine, such as *Pinus koraiensis*, are rich in vitamins, amino acids, mineral elements and other nutrients. In this study, Li et al. [8] provide a comprehensive overview of the most influential factors, methods, and techniques that can be adopted in order to improve flowering and seed production in conifers species. The review revealed that flowering and seed yields in conifers are mainly affected by pollen, temperature, light, water availability, nutrients, etc. Several management techniques have been developed for improving cone yields, including topping off, pruning, fertilization, plant growth regulators, supplementary pollination, etc. Moreover, flowering-related genes that are crucial in the flowering of coniferous trees were identified.

Author Contributions: Conceptualization, M.M. and G.T. writing—original draft preparation, M.M.; writing—review and editing, G.T. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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