frontiers | Frontiers in Sustainable Food Systems

TYPE Editorial
PUBLISHED 04 January 2023
DOI 10.3389/fsufs.2022.1061079

OPEN ACCESS

EDITED AND REVIEWED BY
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SPECIALTY SECTION
This article was submitted to Agro-Food Safety, a section of the journal Frontiers in Sustainable Food Systems

RECEIVED 04 October 2022
ACCEPTED 14 December 2022
PUBLISHED 04 January 2023

CITATION
Khaliq G, Ali S, Gapper N and Nicola S (2023) Editorial: Recent advances and approaches in the application of elicitors to enhance resistance mechanisms in fresh produce. *Front. Sustain. Food Syst.* 6:1061079. doi: 10.3389/fsufs.2022.1061079

Editorial: Recent advances and approaches in the application of elicitors to enhance resistance mechanisms in fresh produce

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KEYWORDS

elicitors, resistance mechanism, abiotic stress, fresh produce, food science, quality maintenance

Editorial on the Research Topic
Recent advances and approaches in the application of elicitors to enhance resistance mechanisms in fresh produce

Introduction

Fruits and vegetables have appreciable amounts of flavonoids, anthocyanins, tannins, vitamin C and other phytochemicals. They contain health promising compounds such as anti-inflammatory, anti-oxidative, radical-scavenging activity and gastroprotective properties (Liu, 2013). However, fruits and vegetables are highly perishable food items that cannot be stored for very long time (Bowen et al., 2022). Therefore, reducing losses before and after harvesting is a crucial problem from both an economic and an environmental perspective. Pre and post-harvest abiotic stresses are the main causes affecting quality and production of fresh produce worldwide (Suwannachot et al.). These abiotic stresses may result in a number of physiological, morphological, biochemical and molecular alterations that have a negative impact on plant growth, productivity, and quality characteristics (Ali et al., 2022). Abiotic stresses also affect the shelf-life, quality and nutritional properties, and these alterations can result in significant economic losses for producers, storage operators and retailers.

Increasing concerns over the use of synthetic chemicals for maintaining the post-harvest quality of fresh and fresh-cut produce as well as their unacceptable risk to the population and environment has promoted the introduction of elicitors (Raffo and Paoletti). More attention has been drawn in recent years on the use of physical, biological and chemical elicitors to develop natural resistance in horticultural crops, and is now regarded as a preferred quality management method. In fresh-cut tissues the intensity

of wound's response can be mediated by several factors, including elicitors (Nicola et al., 2021). The goal of this topic was to collect innovative information on how horticulture crops respond to abiotic stress from the nursery to the customer. The research articles presented in this topic looked at how physical or chemical treatments could activate defense systems and explored the efficacy of plant elicitors treatments for reducing oxidative damage as plants demonstrated adaptive responses when subjected to elicitors.

Abiotic stresses

A range of abiotic stresses are responsible to affect fruits and vegetables quality during production, storage and transportation. Some of these stresses can be extremely intense, which would result in quality deterioration (Hodges et al., 2005). Understanding the types of abiotic stresses that impact fruits and vegetables is crucial, as well as their nature. Fruits and vegetables are facing abiotic stresses like salinity, drought, light and extreme temperatures which affect plant susceptibility to post-harvest quality and shelf-life. Abiotic stresses induce metabolic changes associated with ripening, storage and nutritional status (Sommano et al.). Low temperature stresses result in the production of hydrogen peroxide, superoxide anions and lipid peroxidation products as well as reductions of flavor volatile compounds in sensitive fruits and vegetables (Khaliq, 2015). Chilling stress is increasing ethylene production which ultimately hastening the softening process. Additionally, chilling stress alters the metabolism of cell walls by stimulating the cell wall degrading enzymes like endopolygalacturonase and pectin methylesterase enzymes.

Elicitors

Elicitors are crucial in triggering the defense responses against abiotic stressors. It is well-known that fruits and vegetables, when exposed to elicitors, exhibited adaptive mechanisms. Elicitors play a role in a number of defensive processes, including the regulation of enzyme activity, cellular defense against oxidative damage, and abiotic stress tolerance. Fresh produce kept at low temperature was protected from abiotic stressors by exogenous application of γ-aminobutyric acid (Ali et al., 2022). Similarly, hydrogen peroxide (Duarte-Sierra et al.) and nitric oxide (Khaliq et al., 2021) delayed ripening and enhanced resistance of broccoli and custard apple fruits, respectively. Elicitors have a role in a number of defense mechanisms, including the stimulation of β-1,3-glucanase or chitinase enzymes activity, the production of proteins related to resistance, and the activation of the enzymes needed to produce lignin and phytoalexins. Plants can adapt to stress conditions when exogenous elicitors have applied. The exogenous application of elicitors to stimulate defense mechanisms against numerous stresses is included in this Research Topic.

Conclusions

In summary, the articles in this Research Topic identified different abiotic stresses factors and evaluated the effect of elicitors for improving tolerance against abiotic stresses. This Research Topic emphasized the significance of fruit quality maintenance, shelf-life extension and overall to meet consumers satisfaction. The application of elicitors could be a quick and efficient way to keep the post-harvest quality of fresh produce.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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