

Quality Changes in The Fruits and Vegetables After Processing

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A crucial factor that directly affects the desirableness, nutritional value, and general consumer satisfaction of fruits and vegetables is their quality. A healthy diet must include fruits and vegetables because they offer a variety of vitamins, minerals, fibre, and antioxidants that promote overall wellbeing (Arshad et al., 2021). The cultivation of these natural goods as well as their handling, storage, and processing after harvest are all aspects that have an impact on their quality (Nicastro & Carillo, 2021).

Fruits and vegetables can undergo a variety of quality changes as a result of processing, both positive and negative. The precise alterations depend on the kind of processing techniques employed, how long it takes, and the environmental factors involved.

The quality of fruits and vegetables encompasses several attributes

- **Nutritional value:** The existence of necessary vitamins, minerals, and nutrients that support the health and vigour of humans. A wide variety of essential nutrients should be present in high-quality fruits and vegetables (Uthman & Garba, 2023).
- **Freshness:** The quality of having just been picked or newly harvested, which guarantees the best possible flavour, texture, and appearance. The flavour and texture of fresh fruits and vegetables make them very enticing (Agarwal).

- Fruits and vegetables are distinguished by their appearance, which includes their colour, size, form, and lack of blemishes or other flaws. Consumer choices are frequently influenced by attractive looks (Mohamed et al., 2021).
- **Texture:** A fruit or vegetable's ability to be felt, such as its crispiness, juicy, tender, or firm it is. The experience of eating is substantially influenced by texture (Szczesniak, 2020).
- The various flavours and aromas that give fruits and vegetables their overall sensory appeal is known as flavour and aroma. A high-quality produce's distinctive flavour combination is its defining characteristic.
- **Safety:** the assurance that the produce is free of dangerous infections, chemicals, or toxins that could endanger the health of customers.
- Fruits and vegetables preserve their quality and freshness without suffering significant deterioration throughout the duration of their shelf life. Better distribution and less food waste are made possible by longer shelf life.
- **Processing Suitability:** It's critical that fruits and vegetables are suitable for processing without sacrificing quality if they're going to be turned into juices, canned foods, or frozen goods.

Factors affecting quality of fruits and vegetables

A number of interrelated elements, such as product type, minimal operations (such as slicing, washing, antimicrobial, and anti-browning treatments), exposure duration, packaging, and storage temperature conditions, affect the quality of fresh fruits and vegetables.

Product type: Each product type has a unique combination of physical and compositional traits, as well as growing, harvesting, and processing procedures and storage requirements. Size, colour, flavour, texture, nutritional content, insect resistance, processing appropriateness, eating quality, and yield are just a few of the characteristics that differ between cultivars. The cultivar chosen for fresh cut processing has a significant impact on the shelf life and general quality of the final product (Liu et al., 2022).

Processing operations: Peeling, slicing, and shredding are examples of unit operations used in the processing of minimally processed produce. These operations damage surface cells, stress tissues, and in the case of fruits, remove natural barriers like cuticles and skins. This leaves tissues more vulnerable to water loss and decay. Due to processing-related damage, there is an increase in respiration rate and ethylene generation, which could hasten the deterioration of non-climacteric tissues and encourage fruit ripening in climacteric fruits (Giannakourou & Tsironi, 2021).

Packaging: The best strategy for increasing the shelf life of fresh and little processed produce is thought to be modified environment packaging. A decrease in respiration rate, ethylene generation, enzymatic processes, and other physiological problems are of

MAP's advantageous impacts, which improve product quality and shelf life (Yadav et al., 2022).

By actively flushing a gas mixture through the packaging prior to sealing, MAP tries to actively construct an optimum gas composition within the packaging, which can be directly generated by the commodity inside the package.

Transport and storage: One of the most important aspects in preserving the quality of minimally treated produce is storage temperature. To preserve fruits and vegetables at the ideal temperature from the point of processing to the destination, cold chain management is crucial (Oberoi & Dinesh, 2019). As a result, physiological processes are slowed down and microbial growth is decreased, maintaining freshness and nutrient content.

Positive attributes of processing of fruits and vegetables

Preservation: By lowering microbial activity, enzymatic reactions, and moisture content, processing can increase the shelf life of fruits and vegetables while maintaining their freshness for a longer period.

Safety: Some processing techniques, including pasteurisation and canning, can eliminate dangerous microorganisms, making the food safer to eat (Ariyamuthu et al., 2022).

Convenience: For the benefit of consumers, processed fruits and vegetables frequently come in ready-to-eat or simple-to-prepare formats.

Nutritional Retention: Some processing processes, such as freezing, can help fruits and vegetables maintain their nutritional value more effectively than other approaches (Waghmare et al., 2022).

Enhancement of Flavour: Certain processing techniques, such as dehydration and drying, can concentrate the inherent flavours of fruits and vegetables, making them more potent and palatable.

Negative attributes of processing of fruits and vegetables

Nutrient Loss: Heat-sensitive nutrients, such as vitamin C and several B vitamins, can be lost during certain processing techniques, such as high-temperature cooking and lengthy storage (Coe & Spiro, 2022).

Changes in Texture: Fruits and vegetables' textures might change as a result of processing. For instance, freezing and canning could make some veggies mushy or softer.

Changes in Colour: Fruits and vegetables' colours may fade or alter as a result of processing, which affects how appetising they appear (Gençdağ et al., 2022).

Flavour Loss: While certain processing techniques improve flavours, others may cause the loss of volatile chemicals that give fruits and vegetables their distinctive flavours and aromas.

Additives: Some processed foods may contain additives like preservatives, sugars, or sodium to improve flavour or shelf life, which may not be appealing to consumers who are concerned about their health (Ukwo et al., 2022).

Conclusion

To preserve the nutritional value and quality of fruits and vegetables to the greatest extent possible, it is crucial to select the right processing techniques and ensure correct handling and storage. A balanced and nutritious diet can also be

maintained by consuming a range of fresh, minimally processed fruits and vegetables.

References

1. Agarwal, M. A Review Study on Developments in Packaging of Fresh Fruits.
2. Ariyamuthu, R., Albert, V. R., & Je, S. (2022). An overview of food preservation using conventional and modern methods. *Journal of Food and Nutrition Sciences*, 10(3), 70-79.
3. Arshad, M. S., Khalid, W., Ahmad, R. S., Khan, M. K., Ahmad, M. H., Safdar, S., ... & Suleria, H. A. R. (2021). Functional foods and human health: An overview. *Functional Foods Phytochem Health Promoting Potential*, 3.
4. Coe, S., & Spiro, A. (2022). Cooking at home to retain nutritional quality and minimise nutrient losses: A focus on vegetables, potatoes and pulses. *Nutrition Bulletin*, 47(4), 538-562.
5. Gençdağ, E., Özdemir, E. E., Demirci, K., Görgüç, A., & Yılmaz, F. M. (2022). Copigmentation and stabilization of anthocyanins using organic molecules and encapsulation techniques. *Current Plant Biology*, 29, 100238.
6. Giannakourou, M. C., & Tsironi, T. N. (2021). Application of processing and packaging hurdles for fresh-cut fruits and vegetables preservation. *Foods*, 10(4), 830.
7. Liu, X., Le Bourvellec, C., Yu, J., Zhao, L., Wang, K., Tao, Y., ... & Hu, Z. (2022). Trends and challenges on fruit and vegetable processing: Insights into sustainable, traceable, precise, healthy, intelligent, personalized and local innovative food products. *Trends in Food Science & Technology*, 125, 12-25.

8. Mohamed, A. R., El Masry, G. M., Radwan, S. A., & ElGamal, R. A. (2021). Development of a real-time machine vision prototype to detect external defects in some agricultural products. *Journal of Soil Sciences and Agricultural Engineering*, 12(5), 317-325.
9. Nicastro, R., & Carillo, P. (2021). Food loss and waste prevention strategies from farm to fork. *Sustainability*, 13(10), 5443.
10. Oberoi, H. S., & Dinesh, M. R. (2019). Trends and innovations in value chain management of tropical fruits. *Journal of Horticultural Sciences*, 14(2), 87-97.
11. Szczesniak, A. S. (2020). Food Textures in the United States of America. *Textural Characteristics of World Foods*, 15-25.
12. Ukwo, S. P., Udo, I. I., & Ndaeyo, N. (2022). Food additives: overview of related safety concerns. *Food Sci. Nutr. Res*, 5, 1-10.
13. Uthman, A., & Garba, Y. (2023). Citrus Mineral Nutrition and Health Benefits: A Review. *Citrus Research-Horticultural and Human Health Aspects*.
14. Waghmare, R., Kumar, M., Yadav, R., Mhatre, P., Sonawane, S., Sharma, S., ... & Lorenzo, J. M. (2022). Application of ultrasonication as pre-treatment for freeze drying: An innovative approach for the retention of nutraceutical quality in foods. *Food Chemistry*, 134571.
15. Yadav, A., Kumar, N., Upadhyay, A., Fawole, O. A., Mahawar, M. K., Jalgaonkar, K., ... & Mekhemar, M. (2022). Recent advances in novel packaging technologies for shelf-life extension of guava fruits for retaining health benefits for longer duration. *Plants*, 11(4), 547.
