

Chemical and microbiological approaches to assess tomato quality and safety

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Tomato cultivation plays a central role in global fruit and vegetable production, providing consumers with a rich source of phytochemicals and health-beneficial nutrients.

Food quality and safety represent the current duality that the food industry must address, ensuring that products contain significant amounts of nutrients and bioactive compounds, and comply the maximum allowable levels of chemical and biological contaminants. The overall quality and safety characterization of products is essential to ensure that they meet the required standards and regulations, ultimately safeguarding the health and satisfaction of consumers. Tomato fruit is a biologically dynamic matrix due to its metabolic activity and associated microbiota, and therefore fragile regarding integrity and hygiene.

This study aimed to combine analytical and microbiological techniques for assessing tomato quality and safety. *Solanum Lycopersicum*, L. Ciliegino samples were characterised for the mineral nutrient profile and toxic and potentially toxic element content, as well as for the identification of microbial strains isolated from pulp and wash water. The elemental profile was determined by ICP-AES after microwave-assisted acid digestion. In parallel, culture-based methods were applied to carry out total viable epiphyte and endophyte counts during tomato shelf-life (15 days). Subsequent isolation and identification through DNA sequencing of the most represented colonies were performed to identify potential foodborne pathogens and spoilage microorganisms.

The results suggest that integrating chemical and microbiological methodologies is necessary to establish a comprehensive quality and safety profile, providing information on the presence and levels of nutrients and contaminants, as well as on the microbial community and its evolution during the shelf-life.

Keywords: *Solanum Lycopersicum* L.; food safety; ICP-AES; trace element profile; DNA sequencing

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