

Title Sensory quality, bioactive constituents and microbiological quality of green and red fresh-cut lettuces (*Lactuca sativa*L.) are influenced by soil and soilless agricultural production systems

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Abstract

Quality characteristics and shelf-life of fresh-cut lettuce cultivated in soil, as the traditional production system, and soilless, as an innovative production system, were investigated. Three lettuce genotypes, lollo rosso and red oak leaf as red-leafed genotypes, and butterhead as a green-leafed genotype, were studied. Lettuces from both production systems were grown in the same open field and at the same time in the winter season. A longer growing period was needed, to obtain the same maturity stage, in the soil than in the soilless (102 and 63 d after planting, respectively). After harvest, the visual quality of the fresh-cut produce from red-leafed lettuce cultivated in soilless was better than those in soil. In the case of green-leafed genotype, the soilless system gave a lower visual quality of the fresh-cut product. Lollo rosso cultivated in the soilless system had a higher content of phytochemicals, including vitamin C and individual and total phenolics, than that cultivated in soil. At the end of storage, fresh-cut lollo rosso and red oak leaf grown in the soilless system showed significantly higher content of vitamin C than those in soil. This high content of antioxidants was linked to a better maintenance of visual quality and the control of browning when compared with the fresh-cut product from lettuces cultivated in soil. The soilless system was more effective in controlling microbial contamination as lettuce cultivated in the soilless system had a lower initial microbial load and slower microbial growth during storage. At the end of shelf-life, differences in microbial counts between soil and soilless lettuce were 3 and 1.5 log units higher for lactic acid bacteria and total coliforms, respectively, in soil. This study shows that higher quality and microbiologically safer raw product can be provided by the soilless system as a new growing system although it depends on the genotype and the season.