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A novel approach for determination of invisible quality changes in modified atmosphere packaged fresh and fresh-cut fruit and vegetables

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Many fresh and fresh-cut fruit and vegetables are delivered to consumers in modified atmosphere packages (MAP). At purchase, freshness is evaluated based on the appearance of the product inside the package. However, freshness is also influenced by the odor of the package headspace upon opening. Packages with perceivable off-odors may lead to consumer rejections, food waste and lack of re-purchase because consumers automatically rate such products quality as low.

Formation of unusual odors, the so-called off-odors, may develop from the use of inappropriate raw materials, harsh processing and handling, and inappropriate packaging designs and storage conditions. Measurement of the volatile organic compounds (VOCs) in the headspace of packages can reveal presence of specific off-odors. Results for packaged wild rocket stored at 5 ˚C and 10 ˚C for 8 days showed higher off-odor scores (15-point scale) at 10 ˚C (5.2) than at 5 ˚C (1.5) and higher concentrations of dimethyl sulfide and dimethyl disulfide at 10 ˚C (0.71 and 0.13 ng per g produce) than at 5 °C (0.08 and 0.0.02 ng per g produce). It was found that the scores of the perceived off-odors could be related to the package headspace concentration of dimethyl sulfide and dimethyl disulfide.

The VOC method is promising and can be used to provide consumers with better quality MAP fresh and fresh-cut fruit and vegetables as this method can reveal the invisible quality changes of fresh produce in the supply chain.