

Title Gas diffusion properties at different positions in the pear
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Abstract

Gas transport properties of fruit are important for understanding the internal atmosphere during controlled atmosphere storage. The gas diffusivities at different positions in the pear were determined using a measurement set-up with optical sensors. In addition, the effect of temperature, picking date and browning-inducing conditions on the diffusion properties of pear fruit tissue were studied. The diffusivities of O₂ and CO₂ were low at the skin with values of $(1.86 \pm 0.78) \times 10^{-10}$ and $(5.06 \pm 3.15) \times 10^{-10}$ m²/s. Along the equatorial radial direction of the pear, gas diffusivities in the cortex tissue were almost constant with an average of $(2.22 \pm 0.28) \times 10^{-10}$ and $(2.32 \pm 0.21) \times 10^{-9}$ m²/s for O₂ and CO₂ diffusivities, respectively, while diffusivities were much higher in the core of the pear. Results showed that the diffusivities of gas in the tissue along the vertical axis of the pear were $(11.1 \pm 7.2) \times 10^{-10}$ and $(6.97 \pm 3.79) \times 10^{-9}$ m²/s for O₂ and CO₂ diffusivities, respectively. Gas diffusion properties in the vertical axis were higher than along the equatorial radius axis direction. The O₂ diffusivity was not influenced by temperature while temperature had a statistically significant effect on CO₂ diffusivity although small compared to its biological variable. Picking date had no effect on the gas diffusivities. Diffusivities in brown tissue of disordered pears were smaller than in sound tissue irrespective of whether the sound tissue came from a healthy or a disordered pear.