

Computers explain why pears may become brown during commercial storage

Internal browning of pears stored under low oxygen conditions is related to restricted gas exchange inside the fruit, according to a study published March 7th in the open-access journal PLoS Computational Biology. Researchers at the Catholic University of Leuven in Belgium suggest a computer model that can be used to improve long-term storage of fruit under controlled atmospheres.

Pears and other fleshy fruit are commercially stored under low oxygen conditions to extend their storage life for up to 9 months. If the oxygen concentration in the storage atmosphere is too low, quality disorders such as internal browning may result, causing major economic losses. This disorder is known to be related to the complex mechanisms of gas exchange, respiration and fermentation in fruit. However, further conclusions are unavailable due to the lack of reliable methods to measure gas concentrations inside the fruit.

The team, led by Bart Nicolai, has developed a comprehensive computer model to predict the oxygen concentration inside the pear. The model incorporates equations for gas transport as well as for the respiratory metabolism. The researchers found that extremely low oxygen concentrations can occur in the core of the pear, which eventually may lead to cell death and browning.

While the model was developed for pears, the model is generic. Application to other fleshy fruit and plant organs is straightforward, but the tissue properties and the geometry will need to be measured, Nicolai says. Further advances require investigation of the internal microstructure of the tissue to explain differences in gas exchange properties and to quantify the cellular and intercellular pathways for gas exchange and the metabolic processes.

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