

Spatial distribution of flavor components and antioxidants in the flesh of ‘Conference’ pears and its relationship with postharvest pathogens susceptibility

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Abstract

The spatial distribution of dry matter, ethylene production, respiration rate, organic acids, sugars, antioxidants, volatiles and fungal (*Penicillium expansum* and *Rhizopus stolonifer*) growth was evaluated analyzing four different slices of ‘Conference’ pear flesh taken along an equatorial radius. A common spatial distribution trend was found for ethylene emission, CO₂ production, antioxidant capacity and total phenolic compounds with a minimum in the slice under the skin and a maximum in the slice near the core. Fructose, which was the dominant sugar followed by sucrose and glucose, showed a quasi-linear decreasing profile from the outer slice towards the core. Malic and ascorbic acid had the highest content in the outer slice while citric remained practically constant over the different slices. Twenty-nine volatile organic compounds (VOCs) were identified using solid-phase microextraction (SPME), yet only six of them showed significant differences between flesh slices. The content in VOCs was further related to the tissue susceptibility to the above-mentioned postharvest pathogens using a multivariate approach. Fruit flesh from inner sections was more prone to *P. expansum* whereas flesh from the slice under the skin presented the highest incidence of *R. stolonifer*. A Partial Least Square (PLS) model showed that *P. expansum* growth was negatively correlated with malic acid, dry matter content, 2-ethyl-hexanal and butyl hexanoate concentrations and *R. stolonifer* was negatively correlated to sucrose and some volatiles such as hexanal and 1-butanol. Based on the results from the PLS, selected volatiles naturally present in the pear flesh were tested *in vitro*, at different concentrations, in order to investigate their effectiveness to control blue mold caused by *P. expansum* and soft rot caused by *R. stolonifer*. A completely control of *P. expansum* was found with 2-ethyl-hexanal application and hexanal while 1-butanol showed a total fungicide effect

against *R. stolonifer*. This study is a step towards a better understanding of how biochemical compounds are spatially distributed among different slices of 'Conference' pears as well as in the development of natural compounds to fight major postharvest pathogens in pear fruit.