Dissecting the influence of the orchard location and the maturity at harvest on apple quality, physiology and susceptibility to major postharvest pathogens

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Scientia Horticulturae 285: 110159. (2021)

Abstract

'Golden Reinders' apple quality parameters, fruit physiology, biochemical composition and susceptibility to *Penicillium expansum* and *Rhizopus stolonifer* were analysed in fruit harvested from four different locations (two valley and two mountain orchards) and from the same valley orchard at six different maturity stages. Growing location strongly influenced the taste- and health-related fruit composition whereas the fruit maturity at harvest mainly affected the ethylene biosynthetic pathway and ethylene-dependant quality traits such as the fruit firmness and starch index. The fruit maturity at harvest, but not the growing location, also affected the severity of the infection caused by *P. expansum* and *R. stolonifer*, with mature fruit showing higher susceptibility to pathogen infection. Besides, by employing a Partial Least Square (PLS) regression model, our data showed that the severity of the lesions caused by *R. stolonifer* were intimately related to the fruit ethylene production. Overall, the results from this study demonstrate that differences in environmental conditions between orchards (mountain vs valley) strongly influenced the composition of 'Golden Reinders' apples without affecting the susceptibility of the fruit to two major postharvest pathogens.