Abstract

We have compared changes in a-farnesene and conjugated trienols, as well as gene expression, in scald-resistant cultivars, e.g., 'Gala' and 'Braebum', and in scald-sensitive cultivars, e.g., 'Granny Smith' and 'Red Delicious'. We also carried out similar comparisons in 'Granny Smiths' between controls and treatments that diminish scald symptoms, e.g., low O_2 and MCP. The data show that the initiation of the C_2H_4 climacteric plays a crucial role in scald development since treatments that retard the onset of the climacteric, e.g., low O_2 and MCP, also inhibit symptoms of scald development. Furthermore, if either low O_2 or MCP is applied after the initiation of the C_2H_4 climacteric, their inhibitory effects on scald development decrease. The treatments that retard the C_2H_4 climacteric onset also strongly inhibit the rise in a-farnesene and conjugated trienols. In 'Granny Smith' apples, we studied the effect of temperature on scald development and changes in the content of a-farnesene and conjugated trienols. The data show that at temperatures above 7°C scald did not develop but the rise in a-farnesene and conjugated trienols was not affected. It should be noted that in scald-resistant cultivars stored at 1°C there is an increase in both a-farnesene and conjugated trienols, though not as high as in sensitive ones. However, if the auto-oxidation of a-farnesene is the cause of scald disorder, their levels in the resistant cultivars ought to have been sufficient for the induction of the disorder. It is thus obvious that low temperature must induce "enzymes" that create the scald-causing compounds. We observed that the concentration of malonyl-dialdehide increases only in the areas showing scald symptoms, which in turn indicates that oxidative processes are involved in scald development. Alternatively, in the resistant cultivars the anti-oxidant capacity may be higher than in the sensitive ones. In short, the data show that in addition to cultivars, low temperature and the induction of the C_2H_4 climacteric play a crucial role in scald development.