

Abstract

Aroma volatiles are significant attributes of the taste of apple as well as other fruit. Although this has been recognized long ago its real importance has been perceived only recently. Beside differences in the genetic background of cvs., which are the most decisive determinants in aroma formation, the maturity of the fruit at harvest and the method of storage are among those factors which have the strongest impact on aroma formation. Unfortunately most of these factors act in strictly opposite directions as far as volatile production on the one hand and other quality attributes on the other are concerned. The importance of fatty acids (FA) as precursors of many apple fruit volatiles was recognized already decades ago, leading to the hypothesis that the release of these substances during the breakdown of membranes at ripening stimulates volatile aroma production. This was supported by experiments demonstrating that the application of FA or their breakdown products stimulated aroma production and at the same time indicated that the enzymes needed for ester etc. formation were not limiting. However, more recent investigations cast some doubt on this hypothesis and favoured, instead, a *de-novo* biosynthesis of FA rather than membrane decomposition. Consequently the search for steps limiting ester volatile biosynthesis under conditions mentioned above need to consider reactions involved in FA-biosynthesis. Research along these lines indicated that for apple fruit, possibly due to their high activity of Malic enzyme, NADPH does not seem to be limiting, possibly in contrast to the non climacteric strawberries. ATP, however, show a close correlation to free FA for both species and is always at a low level under conditions of reduced aroma production. Because of this strong dependency of aroma production on "high energy" compounds derived from respiration the observed strong correlation between aroma production and respiration is not surprising. Methods that decrease respiration during fruit maturation and/or storage even further, e.g. by reducing ethylene biosynthesis/perception, most certainly aggravate the "volatile aroma malaise". To overcome low volatile aroma production caused by e.g. a too early harvest or prolonged storage under limiting O₂ conditions needs the development of new strategies. These strategies have to combine physiological mechanisms that, on first glance, seem to exclude each other. Some recent modifications of the traditional CA-storage non the less indicate that this seems possible.