

Title Diagnostic methods to assess the incidence of superficial scald on granny smith apples during storage

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Abstract

Granny Smith is considered a very sensitive apple cultivar to Superficial Scald, a physiological disorder. The incidence of the disorder increases during storage at 0°C and it is partially controlled by the application of the antioxidant diphenylamine (DPA) at harvest. The lack of uniformity in the DPA application and variation of fruit susceptibility among seasons and orchards increase the risk of scalded apples in the market. Conjugated trienols (CTols), 3,7, 11-trimethyldodeca-1,3,5 (E), 10-tetraen-7-ol, oxidized compounds of farnesene, were quantified on methanolic peel apple extracts by high-performance liquid chromatography (HPLC method) and used as diagnostic tool to determine the potential incidence of scald during storage. A rapid and low cost spectrofotometric quantification at 281 nm of apple peel hexane extraction was used as a comparative method (CT281). In order to obtain variation on scald susceptibility, Granny Smith apples were harvested two times, treated with 0, 500 or 2000 ppm of DPA, stored for 30, 60, 90, 150 and 210 days at 0°C and evaluated for scald incidence after 10 days at 20°C. Scald incidence ranged from 3% to 100% on ripened fruit and the maximum value occurred after 150 days at 0°C. Concentration of CTols determined using the HPLC method at 60 days of storage at 0°C was positively related with scald incidence after 150 or 210 days at 0°C plus ripening. A lineal model ($Y = 8.21X$, $R^2 = 0.95$ and $P = 0.0006$) best explained that relationship. Otherwise, the spectrofotometric determination of CTol, the CT281 method, was well correlated with that of the HPLC method ($Y = 1.71 + 1.04X$, $R^2 = 0.89$, $P < 0.001$). Therefore quantification of CTol using a simple and rapid spectrofotometric method at 60 days storage is useful to determine the risk of Granny Smith to scald physiological disorder after longer storage. The proposed method should be validated on a large scale before being recommended for commercial use.