

**Title** Oxalic acid in conjunction with vitamin C has the potential of controlling browning of sliced apples

**Author** R. YORUK, M. R. Marshall, M. O. Balaban, S. Yoruk

**Citation** Book of Abstracts, 2004 IFT (Institute of Food Technologists) Annual Meeting and Food Expo, 13-16 July 2004, Las Vegas, Nevada, USA. 321 pages.

**Keywords** apple; browning; oxalic acid

### **Abstract**

Enzymatic browning in plant products often results in unpleasant discoloration and off-flavor generation. The food industry is continuing to search for methods to prevent browning while considering food safety, marketability of the treated products, and the cost associated with prevention. Although it is not an approved food additive, oxalic acid (OA) is a common component of certain foods and significantly inhibits browning of apple and banana slices. The objective was to formulate a dipping solution containing minimal levels of the natural compounds, OA and vitamin C (AA), for better control of browning on Red Delicious apple and banana slices. Fruit slices were dipped in different combinations of OA (1.5, 3, and 5 mM for apple and 10, 20, 40 mM for banana) with 0.5% AA for 10 min. Browning inhibition was analyzed using a machine-vision system. Degree of browning on cut surfaces was evaluated using 3 approaches: (1) searching for trends in changes in  $\Delta L^*$  valuer, (2) comparing the % differences between control and treatment  $\Delta L^*$  values, and (3) measuring temporal changes in color spectra of the samples. An oxalate kit was used for determination of residual OA levels. Considerable browning occurs when either 0.5% AA or less than 5 mM OA is used alone, whereas, the addition of 0.5% AA permits the use of 1.5 mM OA for an effective anti-browning activity in apple slices. However, OA-AA formulations did not improve browning inhibition of banana slices. The plausible mechanism(s) of browning inhibition achieved with OA and AA are discussed. Combining OA with AA at low concentrations synergistically enhanced browning inhibition in sliced apples. The OA and AA formulations have potential to increase acceptability of minimally processed apples by consumers.