

Title Modeling the effect of ethylene on rate of firmness breakdown and loss of background color of 'Jonagold' apple during CA Storage

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Abstract

It is well established that ethylene plays a major role in the postharvest loss of quality in climacteric fruits. In the current study, the effect of endogenous ethylene concentration on the rate of firmness breakdown, and the loss of background color in 'Jonagold' apple during controlled atmosphere (CA) storage is modeled. Firmness loss was assumed to result from breakdown of pectin by pectin degrading enzymes, while loss of background color was assumed to be due to breakdown of chlorophyll by chlorophyll degrading enzymes. Ethylene is assumed to influence quality degradation by promoting the synthesis of quality degrading enzymes. Based on these reactions, and assuming a linear transformation between pectin concentration and firmness, and between chlorophyll concentration and color, a set of differential equations were written for both firmness breakdown and loss of background color in apples. To obtain values for the parameters in the developed model, 'Jonagold' apples were harvested and stored at 1°C and 4°C, under different CA conditions for different storage durations (2, 4 and 6 months), during which the firmness, background color and the ethylene concentration were measured. A good correlation was obtained between the measured and modeled data for both firmness and background color of the apples.