Abstract:

Apples are an important agricultural commodity worldwide. Most apples are produced for the fresh market and have to be stored under controlled atmosphere (CA) conditions to avoid excessive softening. The softening of fruits is the result of structural changes in the cell walls under the control of the ripening hormone ethylene. Ethylene is synthesized in plants from S-adenosyl-L-methionine by a short pathway that consists of two enzymes: 1-aminocyclopropane-1-carboxylic acid synthase (ACS) and 1-amino-cyclopropane-1-carboxylic acid oxidase (ACO). To interfere with ethylene synthesis in plants we have cloned two ACS genes from ripening 'McIntosh' apples. The gene having the closest similarity to the ripening-related ACS gene in other fruits was used to make an antisense construct. 'Royal Gala' plants were transformed with the antisense construct using an Agrobacterium-mediated transformation system. Transgenic plants were propagated on antibiotic-containing agar, transferred to the greenhouse for conditioning, and later to the field. Transgenic 'Royal Gala' fruits that developed on these trees were evaluated for morphological characteristics, ethylene production, ACS activity, and ripening parameters. Data indicate down regulation of ethylene production and reduced softening were achieved in some transgenic lines. This indicates improved storability of the ethylene down- regulated transgenic fruit and suggests that structural integrity of this fruit may be maintained simply under refrigerated storage and controlled humidity.