

The *isocitrate dehydrogenase 1* gene is associated with the climacteric response in tomato fruit ripening

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Abstract

Climacteric ripening is related to a respiratory climax accompanied by an exponential increase in ethylene production. This association is not fully understood. Tomato fruit were exposed to the ethylene antagonist 1-methylcyclopropene (1-MCP) at different ripening stages and their transcriptome was monitored. *ISOCITRATE DEHYDROGENASE 1* (ICDH, Solyc01g005560.2.1) was the only respiratory process related gene that was down regulated at all ripening stages including the mature green. Silencing *SlICDH1* using VIGS (virus induced gene silencing), to about 50 % of its native expression, in Micro-Tom tomatoes, reduced both respiration and ethylene production of the harvested fruit. Silenced *SlICDH1* tomatoes also exhibited prolonged ripening and reduced susceptibility to the pathogen *Botrytis cinerea*. In addition, ethylene response factors binding sites were identified in the promotor and in the first intron of *SlICDH1*. These results suggest that regulation of *SlICDH1* is a key step in the initiation of the climacteric rise of respiration via ethylene regulation.