

## Ethanol vapor treatment suppresses ethylene production and action in 'Elstar' apples

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### Abstract

*This work evaluated the effect of ethanol vapor treatments on the ethylene production and/or ethylene action in 'Elstar' apples after 4 months storage. For 24 h at 20±1°C, the following treatments were applied: [1] untreated control, [2] 250 ppm ethanol, [3] 500 ppm ethanol, [4] 150 ppm ethylene, [5] 250 ppm ethanol + 150 ppm ethylene, and [6] 500 ppm ethanol + 150 ppm ethylene. After treatment, fruit were held in air for 14 d at 20°C. Ethylene production, flesh firmness and skin ground colour were evaluated direct after treatment and after 7 and 14 d following it. The results clearly showed that the ethanol application suppressed ethylene production, regardless of the ethanol concentration used. Additionally, the ethanol application inhibited ethylene action, as the fruit treated with both ethanol and ethylene had the same firmness compared to those only treated with ethanol, and was significantly firmer when compared to the control and the ethylene alone treatments. A similar result was observed for the ground colour, where the ethanol application also inhibited ethylene action, and maintained a greener ground colour compared to the control and the 150 ppm ethylene treatment. In summary, the ethanol vapor treatment had significant effect on ethylene biosynthesis and action in 'Elstar' apples, and is a promising technology to extend shelf-life.*

**Keywords:** *Malus domestica*, anaerobic metabolism, ethylene, flesh firmness, ground colour.

### Introduction

Storage of apples in a dynamic controlled atmosphere may induce the fermentative pathway by exposing the fruits to extremely low oxygen partial pressures. Reduction of partial oxygen pressure below the ACP (anaerobic compensation point), or even before it reaches levels above the ACP, results in changing to anaerobic pathway. Excess ethanol may result in off-flavors, however low doses of ethanol may be beneficial in storage by suppressing the ripening process and ethylene production and action. Thus, the aim of this work was to evaluate the effect of ethanol vapor treatments on the ethylene production and/or ethylene action in 'Elstar' apples.

### Material and Methods

Apple fruit were harvested at optimum harvest point for long term storage, then fruit were moved to 26L containers at 20°C where the following treatments were applied for 24 hours: [1] untreated control, [2] 250 ppm ethanol, [3] 500 ppm ethanol, [4] 150 ppm ethylene, [5] 250 ppm ethanol + 150 ppm ethylene, and [6] 500 ppm ethanol + 150 ppm ethylene. The fruit were evaluated after treatment, after 7 d and after 14 d shelf-life about internal ethylene production, respiration rate and flesh firmness.

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**Results and Discussion**

The results clearly showed that the ethanol application suppressed ethylene production, regardless of the ethanol concentration used.

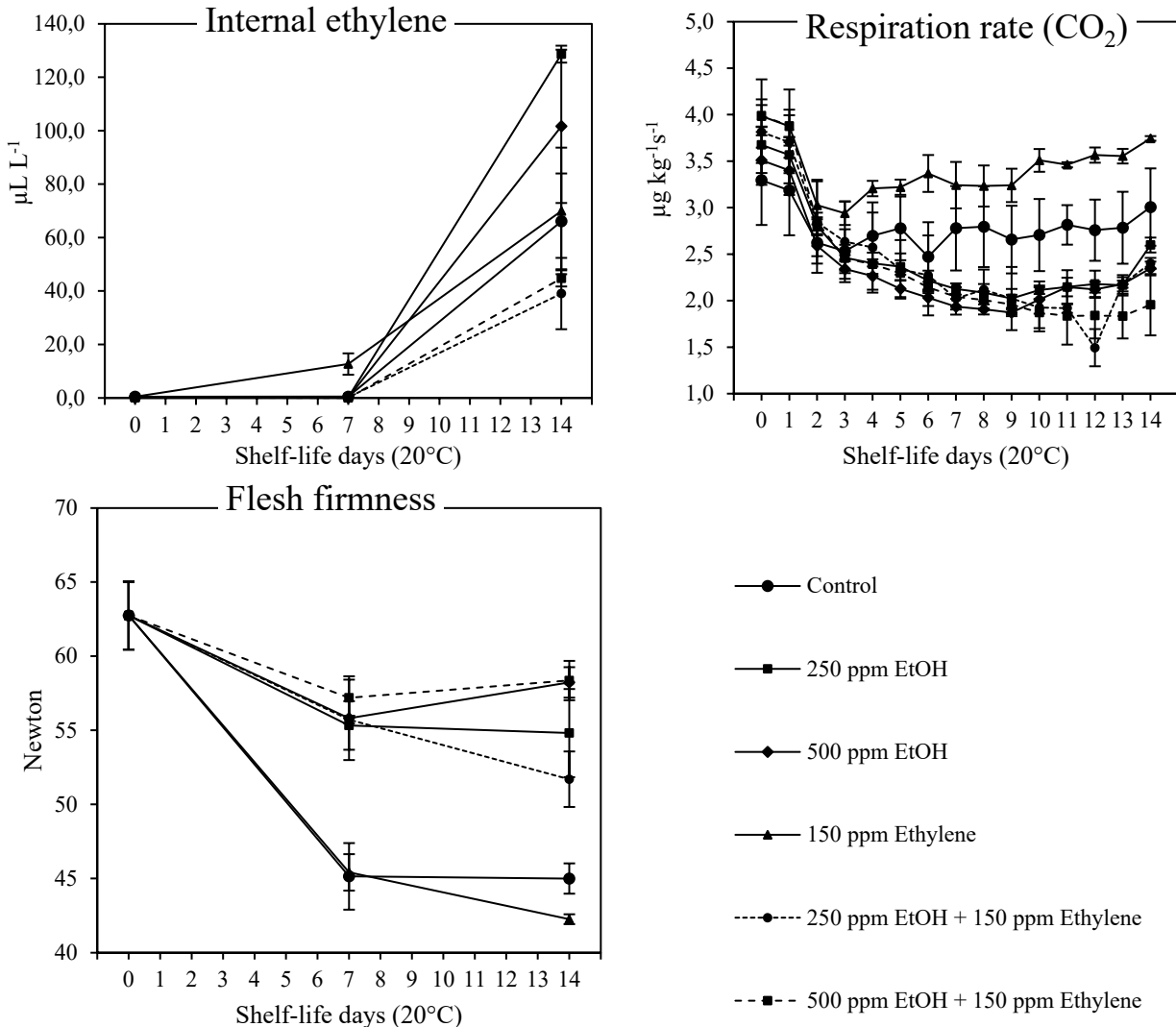


Fig. 1: 'Elstar' apples treated with different ethanol and ethylene doses after harvest and exposed to 7 and 14 days shelf life at 20°C before evaluation.

**Conclusion**

The ethanol vapor treatment had significant effect on ethylene biosynthesis and action in 'Elstar' apples, and is a promising technology to extend shelf-life.

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