

**Title** The use of natural antifungal compounds improves the beneficial effect of MAP in sweet cherry storage

**Author** M. Serrano, D. Martínez-Romero, S. Castillo, F. Guillén and D. Valero

**Citation** Innovative Food Science & Emerging Technologies, Volume 6, Issue 1, March 2005, Pages 115-123

**Keywords** *Prunus avium* L.; Essential oils; Fruit quality; Decay; Ripening; MAP

### Abstract

Sweet cherry shows severe problems for commercialisation mainly due to incidence of decay and a fast loss of sensory quality, both for fruit and stem. A package has been developed based on the addition of eugenol, thymol, menthol or eucalyptol (pure essential oils) separately to trays sealed with polypropylene bags to generate a modified atmosphere (MAP). In addition, cherries in MAP (without essential oils) were selected and served as controls. All cherries were stored during 16 days at 1 °C and 90% RH. Steady-state atmosphere was reached after 9 days of cold storage with 2–3% of CO<sub>2</sub> and 11–12% of O<sub>2</sub> with no significant differences between treated and control, with the exception of eucalyptol, in which significant increases in CO<sub>2</sub> and decreases of O<sub>2</sub> were obtained. When fruit quality parameters were determined, those treated with eugenol, thymol or menthol showed benefits in terms of reduced weight loss, delayed colour changes and maintenance of fruit firmness compared with control. Stem remained green in treated cherries while they became brown in control. However, cherries packaged with eucalyptol behaved even worst than control cherries, with generation of off-flavours, loss of quality and stem browning. Finally, the microbial analysis showed that all essential oils reduced moulds and yeasts and total aerobic mesophilic colonies by 4- and 2-log CFU compared with control, respectively. In conclusion, the use of MAP in combination with eugenol, thymol or menthol is an effective tool on maintaining cherry fruit quality and reducing the occurrence of decay.

### Industrial relevance

The data presented in this work suggest that the use of pure essential oils (eugenol, thymol or menthol) in combination with modified atmosphere packaging (MAP) is an innovative and useful tool as alternative to the use of synthetic fungicides in fruits and vegetables, especially for those which are highly perishable and have a short shelf-life, as cherries. These compounds have been included in the list of generally recognized as safe (GRAS) compounds by FDA. As far as we know, this is the first paper dealing on the use of natural antifungal compounds and MAP and that these combined technologies confer benefits in fruit storage and retailing, with reduction in spoilage microorganisms, maintenance of cherry quality attributes and extension of shelf-life. The effects of these natural compounds on individual microorganisms, both responsible for spoilage and food-borne pathogens, as well as the minimum concentration to gain effectiveness deserve further research.