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Effect of Combination of $KMnO_4$ Oxidation and UV-C Radiation on Postharvest Quality of Refrigerated Pears cv. 'Ercolini'

Ramiro Alonso-Salinas [1], José Ramón Acosta-Motos [2,3,*], Antonio J. Pérez-López [1], Luis Noguera-Artiaga [4], Estrella Núñez-Delicado [2], Francisco Burló [4] and Santiago López-Miranda [1]

[1] Department of Food Technology and Nutrition, UCAM Universidad Católica de Murcia, Avenida de los Jerónimos 135, Guadalupe, 30107 Murcia, Spain
[2] Chair of Entrepreneurship in the Agri-Food Sector UCAM-Santander, UCAM Universidad Católica de Murcia, Avenida de los Jerónimos 135, Guadalupe, 30107 Murcia, Spain
[3] Group of Fruit Tree Biotechnology, Department of Plant Breeding, CEBAS-CSIC, Campus Universitario de Espinardo, 30100 Murcia, Spain
[4] Research Group "Food Quality and Safety", Centro de Investigación e Innovación Agroalimentaria y Agroambiental, Miguel Hernández University of Elche, Carretera de Beniel km 3.2, 03312 Orihuela, Spain
* Correspondence: jracosta@ucam.edu; Tel.: +34-968-278756

Abstract: This present study proposes an improvement for the postharvest preservation of the 'Ercolini' pear, a fruit that is little tested in the field, using a combination of ethylene elimination methods. The techniques used were potassium permanganate filters in devices with ultraviolet radiation and constant air flow to favour the contact of ethylene with the oxidising agents. The analysis carried out included weight, diameter, firmness, soluble solids content, total acidity, maturity index, ascorbic acid concentration, total phenolic compounds, antioxidant capacity via the ORAC method and a descriptive sensory analysis using experts. In addition, the ethylene removal method was tested at two storage temperatures: 1 °C, near optimal temperature, and 8 °C, the standard temperature for transport and storage of fruit on a commercial scale. The results showed a marked improvement in the maintenance of postharvest physicochemical quality using the proposed combination of methods. The sensory analysis confirmed what was observed in the laboratory, with higher organoleptic quality values observed in pears treated with the complete system under study consisting of filter and machine, highlighting the greater presence of flavours and odours related to green fruit. Ultimately, this innovation could be highly relevant for the food industry.

Keywords: climacteric fruit; fruit storage; potassium permanganate; *Pyrus communis*; UV-C

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1. Introduction

The presence of ethylene in preservation atmospheres has been shown to be detrimental to the quality and shelf life of fruit and vegetables. In the case of climacteric fruits, ethylene accelerates the ripening processes, a highly undesirable aspect for their optimal commercialisation, leading to waste in a world that is becoming increasingly populated and more demanding of high-quality food. Fruit ripening is a complex process that promotes both physical and physiological changes, leading to a progressive deterioration of the products. Postharvest ripening cannot be stopped but it can be slowed down [1–3].

According to the report on the "DOP Pera Ercolina de Jumilla" carried out by Jesús García Brunton in 2011, pears of the variety 'Ercolini' belong to the group of climacteric fruits. This variety is characterised for having a medium size, as compared to other varieties such as 'Bosc Kobak' [4,5], with white and juicy flesh. Its skin is green and turns yellow when it ripens, a process that takes place very quickly. For this reason, it is essential to store them correctly in atmospheres without ethylene. Its maximum storage time is 3 weeks. The annual production of the 'Ercolini' pear in the Region of Murcia is approximately

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