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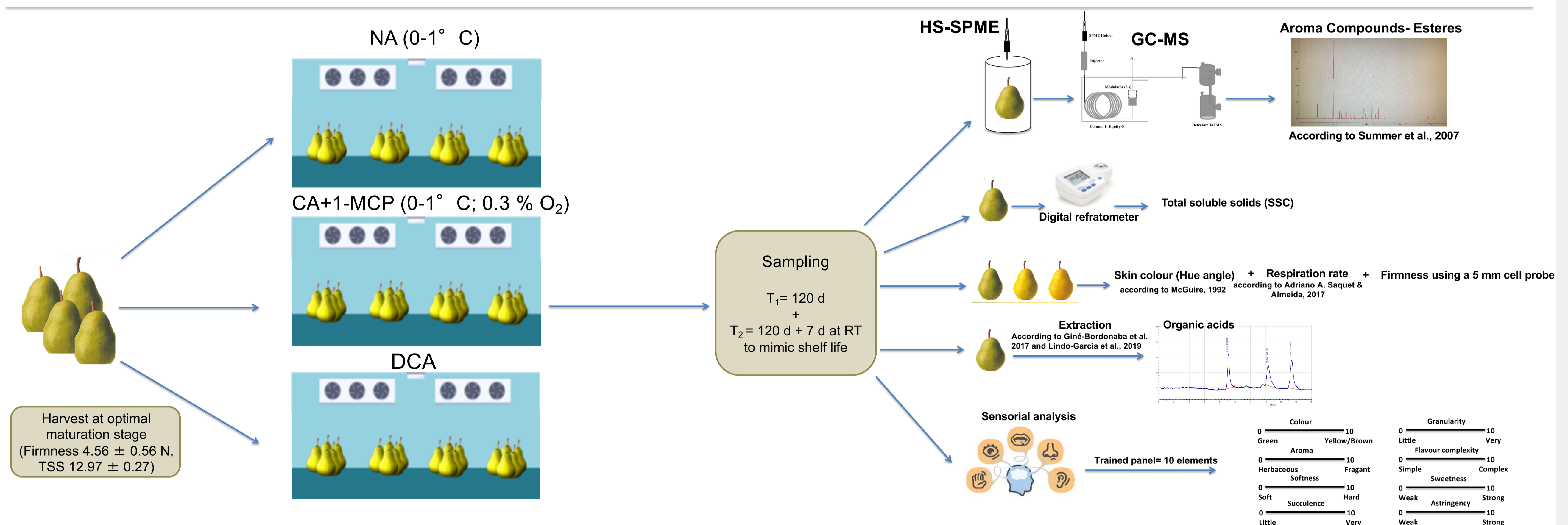
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## Introduction

'Rocha' pear (*Pyrus communis* L. cv. Rocha), a DOP (Denomination of Protected Origin) cultivar from West region of Portugal, is the 4th pear cultivar in Europe and the main cultivar in Portugal, with an average annual production of 173 000 tons. It contributes to significant revenues for the Portuguese economy (120-130 M€/year) [1-2]. Soil-climatic factors and optimal orchard management generate this product with exceptional organoleptic and nutritional quality, appreciated worldwide. Lifestyles of modern consumers, along with the demand for natural, fresh, flavourful, convenient and high-quality products throughout the year have raised the need of developing adequate storage conditions. Storage at low temperature is a traditional practice to decrease the senescence rate responsible for the quality deterioration and pathogens development [3-4]. Fruit can be stored at low temperature for 3-4 months, at which point they become sensitive to physiological disorders, leading to unsatisfactory quality. However, in appropriate storage conditions, fruit can be stored for up to 10 months, without damage. This can be achieved by changing the level of oxygen and carbon dioxide, inhibiting the respiration and ethylene production [5]. Controlled (CA) and dynamic controlled atmospheres (DCA) together with cold temperature may effectively control fruit quality [4]. 1-MCP (a potent ethylene action inhibitor) is widely used in combination with low temperature and CA is another tool to prevent fruit from chilling injuries, such as superficial scald [5] and can also extend fruit quality [6]. However, the metabolic processes are slowed down during prolonged cold exposure, causing several biochemical modifications in fruit ripening behaviour, including changes in appearance, flavor, texture, and aroma [7]. In this way, this study was aimed to assess the physicochemical and sensorial impact of 4 months of cold storage after harvest under normal atmosphere (NA), CA+ 1-MCP and DCA in the ripening profile of 'Rocha' pear.

## Methods



## Results

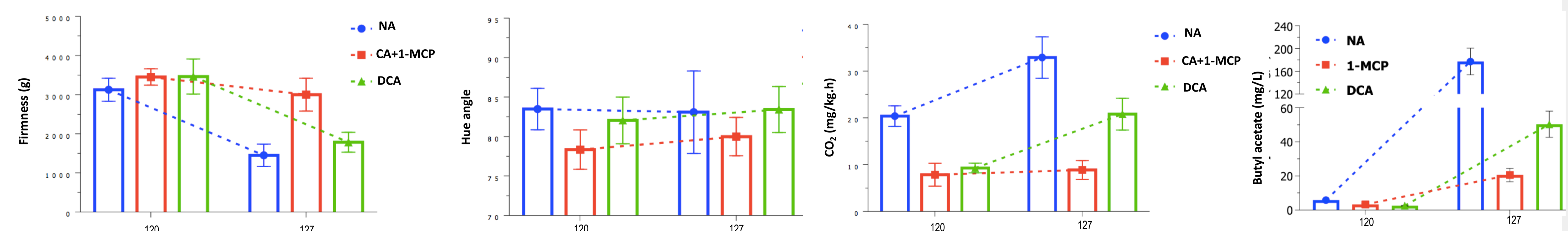


Figure 1. Left: Firmness of pear stored under different atmospheres after 120 of storage + 7 days at RT, Right: Hue angle of pear stored under different atmospheres after 120 of storage + 7 days at RT. Values are means  $\pm$  standard deviation of 6 determinations.

Figure 3. Left: Respiration rate of pear stored under different atmospheres after 120 of storage + 7 days at RT, Right: Butyl acetate production by pear stored under different atmospheres after 120 of storage + 7 days at RT. Values are means  $\pm$  standard deviation of 4 determinations.

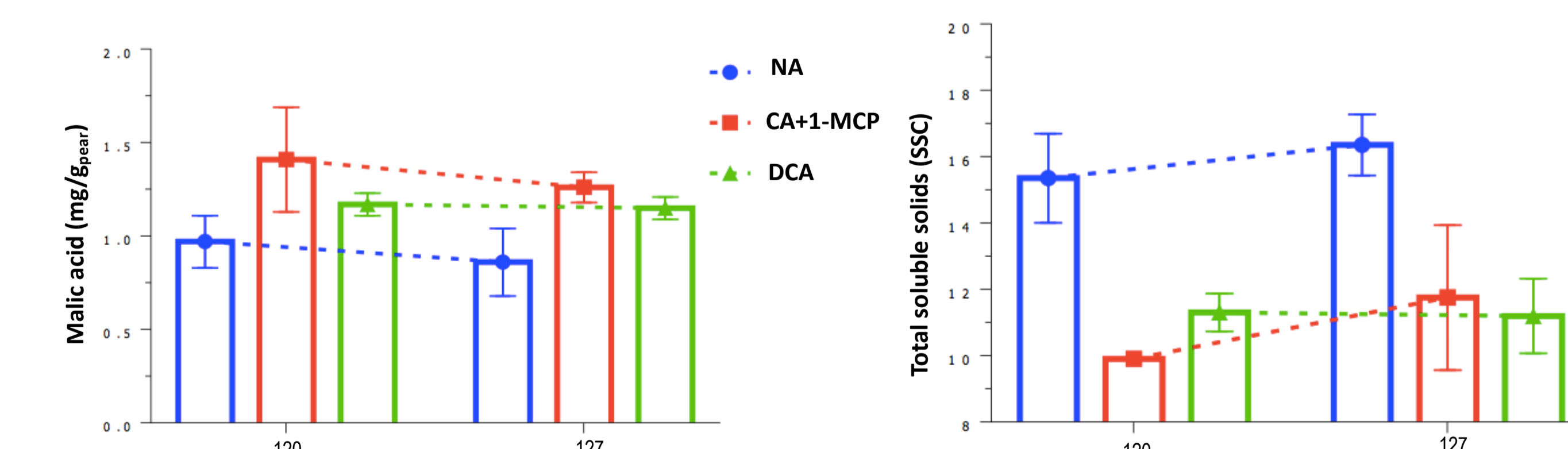


Figure 2. Left: Malic acid concentration of pear stored under different atmospheres after 120 of storage + 7 days at RT, Right: Total soluble solids of pear stored under different atmospheres after 120 of storage + 7 days at RT. Values are means  $\pm$  standard deviation of 4 replicates with 2 biological replicates each.

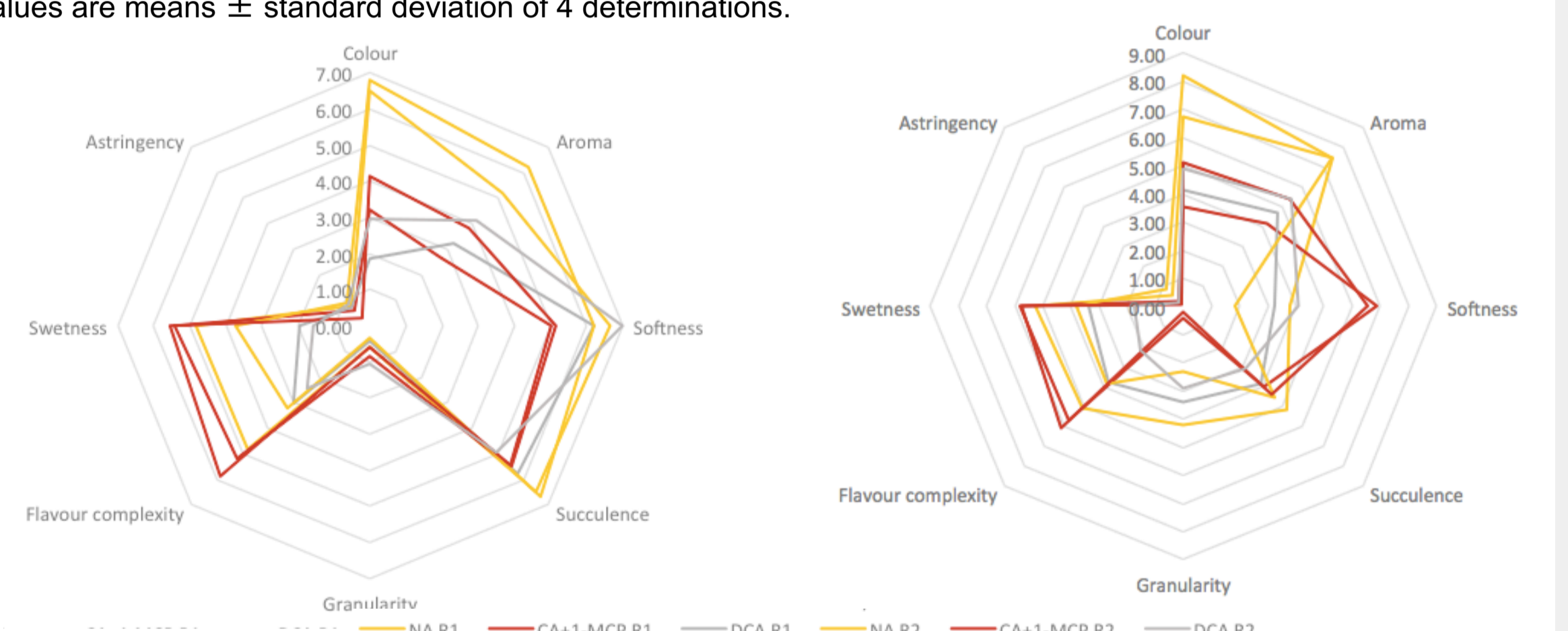


Figure 4. Organoleptic profile of pear stored under different atmospheres after 120 of storage + 7 days at RT. Values are means  $\pm$  standard deviation of 4 replicates.

## Conclusions

- CA+ 1-MCP and DCA had an overall impact on ripening, especially on firmness, respiration rate and SSC. The lower respiration rate observed in CA+ 1-MCP and DCA explained the higher firmness and lower SSC observed, which can be related with the lower activity of cell-wall enzymes activity and lower starch degradation into sugars, thus indicating reduced ripening rate. Also, the higher concentration in malic acid detected is in agreement with the lower respiration rate since this organic acid is a primary substrate for respiration.
- Regarding sensorial analysis when compared to physicochemical results, some attributes were coincident, namely the lower hue angle detected in CA+ 1-MCP was also perceived by the sensorial panel, which attributed a greener score. Regarding the aroma profile, volatile emission of butyl acetate (one of the most ester produced during pear ripening) in both CA+ 1-MCP and DCA was lower than NA and matched with the panel perception. Additionally, firmness profile is also coherent with the sensorial analysis. However, despite the lower SSC content measured in CA+ 1-MCP, this difference was not detected by the sensorial panel.
- From the present work, it was observed that under CA+ 1-MCP and DCA pears did not follow a normal ripening, at least after 7 days at RT, indicating their potential as long-cold storage preservers. However, in terms of sensorial quality, pear treated with 1-MCP were scored, in some quality parameters, equally to the pear stored under NA.

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