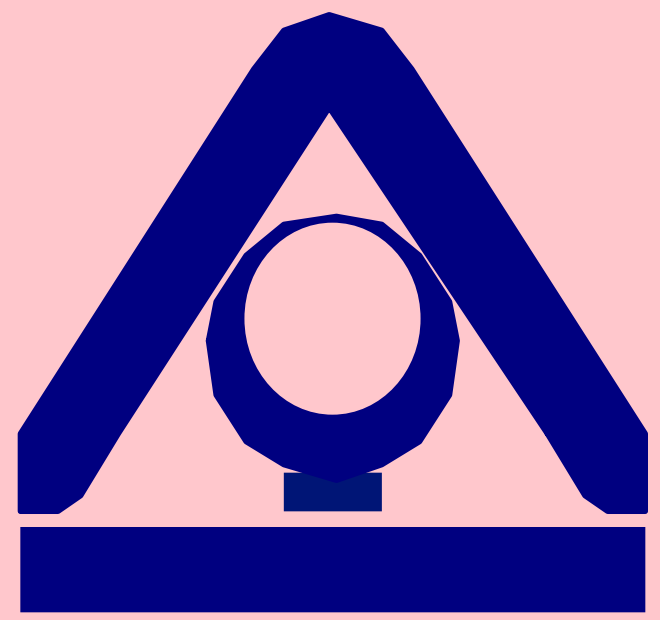


POLYPHENOL OXIDASE ACTIVITY DURING RIPENING OF PEAR FRUIT



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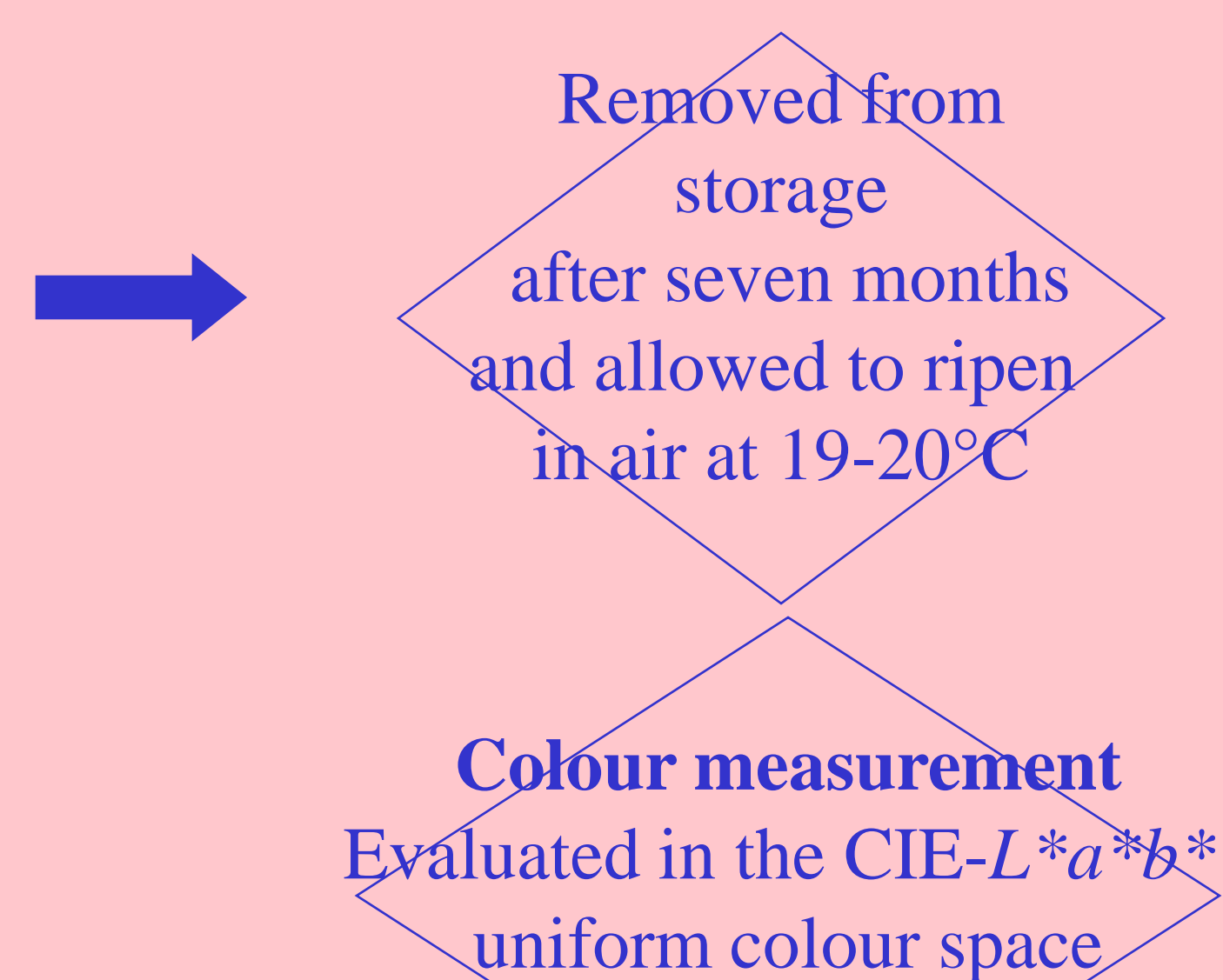
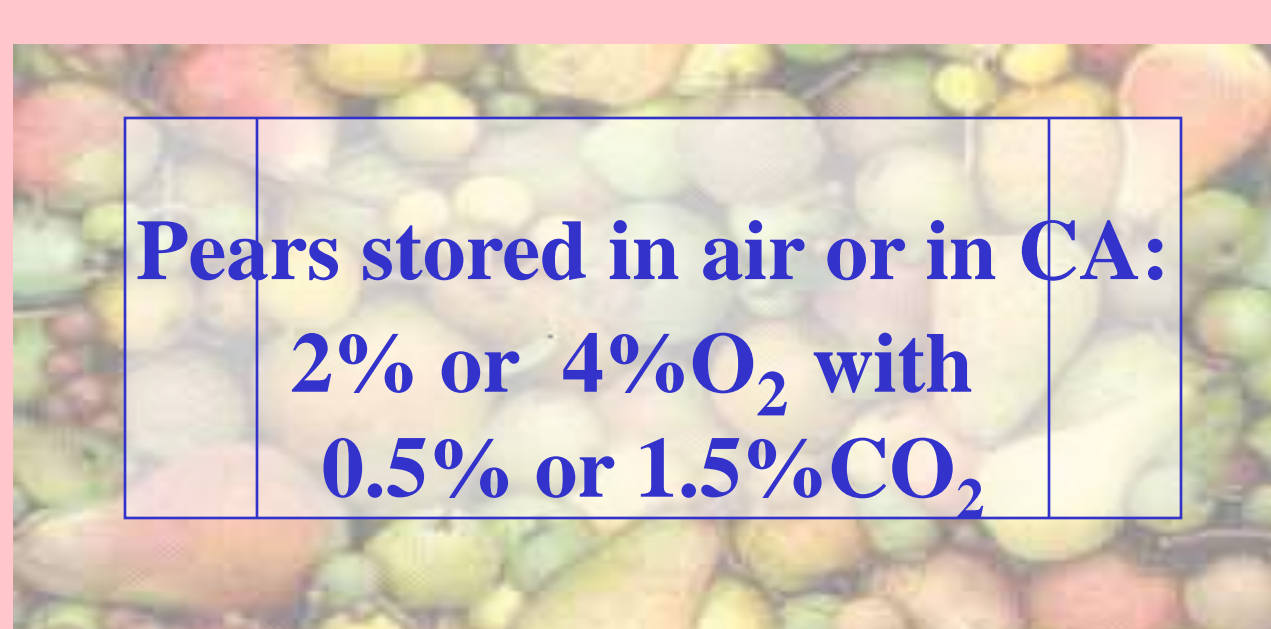


INTRODUCTION

Enzymatic browning in fruits and vegetables is often an undesirable reaction for being responsible for unpleasant sensory attributes and losses of nutritional quality. The main enzyme involved in this reaction is polyphenol oxidase (EC 1.14.18.1; PPO). Normally, the natural phenolic substrates are separated from the PPO enzyme in the intact tissue [1]. Physicochemical modifications of membranes generally cause subcellular decompartmentation leading to enzyme-substrate contact and, therefore, cause browning [2]. Browning of fruits may arise during storage, limiting their shelf-life. Oxygen is essential for the natural browning of plant substrates; so using controlled atmospheres with low level of oxygen is expected to reduce PPO activity. The aim of this work was to evaluate the effect of controlled atmosphere (CA) on the PPO enzyme activity of pear (cv. Rocha) after seven months of storage.

MATERIAL AND METHODS

The Portuguese variety of pear 'Rocha' was picked at commercial maturity in August, 1997.



Enzyme determination

Frozen samples of pear from each CA condition were homogenised (Labortechnik homogeniser) in sodium phosphate pH 6.5 with PVPP and Triton X-100

The homogenate was centrifuged at 4°C (Sorvall RC-5C, Instruments Dupont). 0.100 mL of the filtered was combined with 2.800 mL of catechol in 0.05 M sodium phosphate buffer pH 6.5

The increase in absorbance at 420 nm was recorded using a spectrophotometer (Model UV-260, Shimadzu Corporation) at room temperature. The reference cuvette contained 2.900mL of substrate solution. All determinations were performed in triplicate

RESULTS AND DISCUSSION

After three days of exposure to air at room temperature, PPO activity of samples from 4% O₂ + 1.5% CO₂ were significantly different from the samples from the air and 2% O₂ + 1.5% CO₂ conditions, presenting the lowest PPO values.

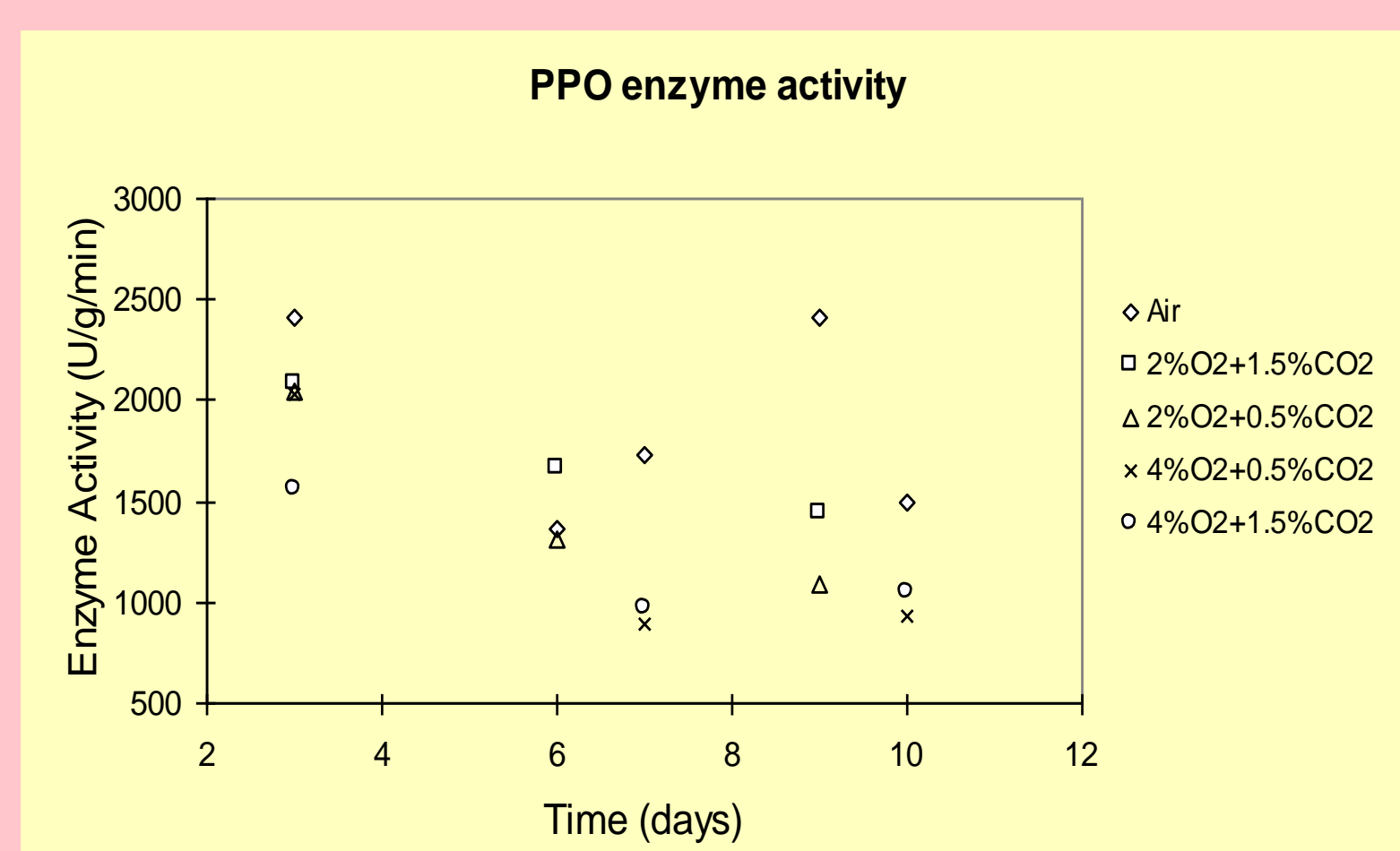


Figure 1. PPO enzyme activity (U/g/min) of 'Rocha' pear after seven months of storage in controlled atmosphere and exposure to air at room temperature (19-20°C)

After seven days of exposure, the conditions of 4% O₂ presented lower enzyme activity than the control condition. There were no differences in the PPO activity of samples from air and the two conditions of 2% O₂ after six days of exposure. After nine and ten days of exposure, the samples from air had higher PPO activity than all the other conditions. However, any significant difference was found between the CA conditions for each day.

ACKNOWLEDGMENTS

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After three days of exposure to air at room temperature, air-stored samples presented a low h* value. No differences were found in this colour parameter between the CA conditions tested. At days six, seven, nine and ten, the control presented higher b* and c* values than CA samples, revealing a higher extent of browning. After seven, nine and ten days, there is no significant difference in colour of samples from the two conditions of 2% O₂ or in colour of samples from the two conditions of 4% O₂. At day 6, the fruits from the condition of 2% O₂ + 1.5% CO₂ presented the lowest b* value.

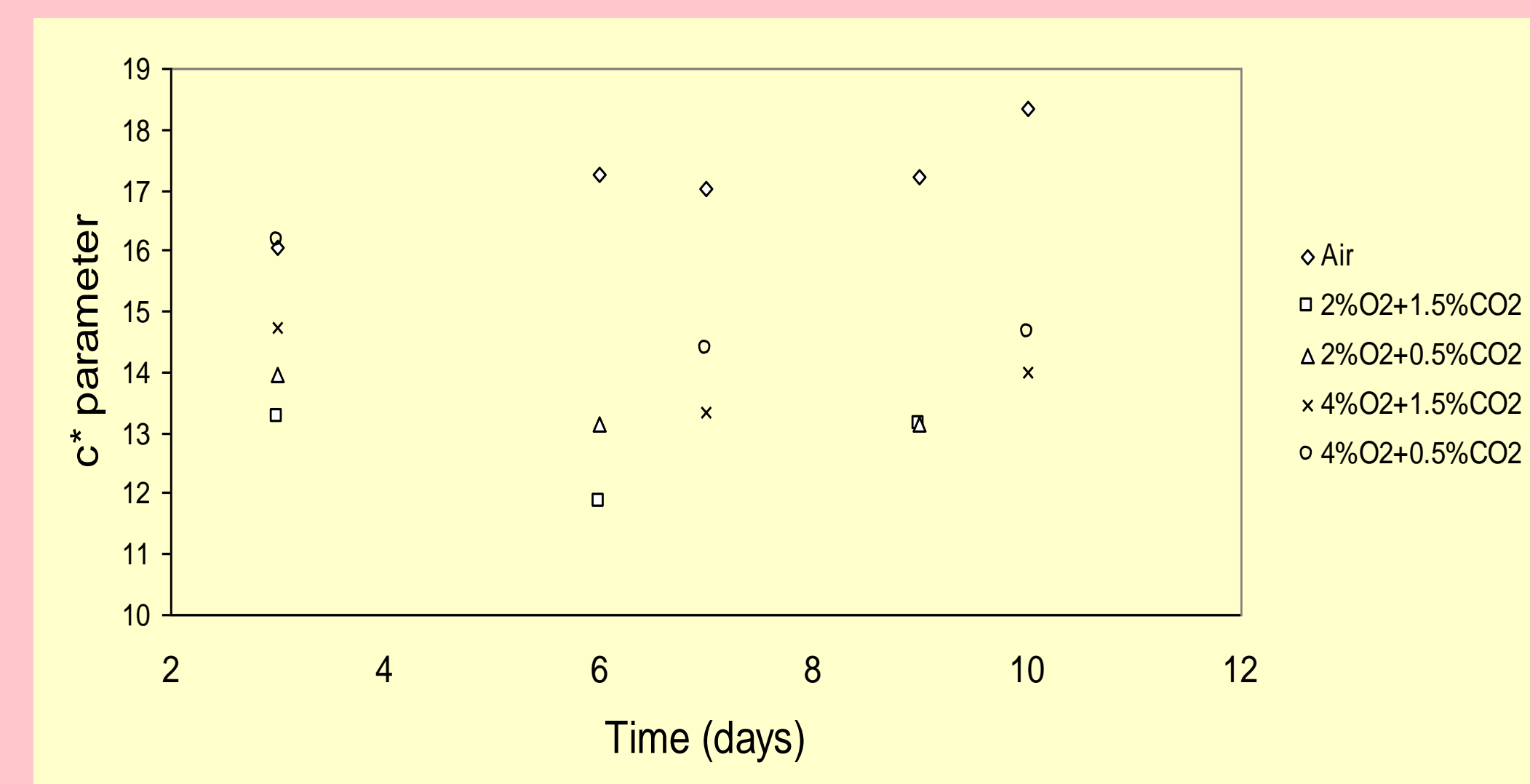
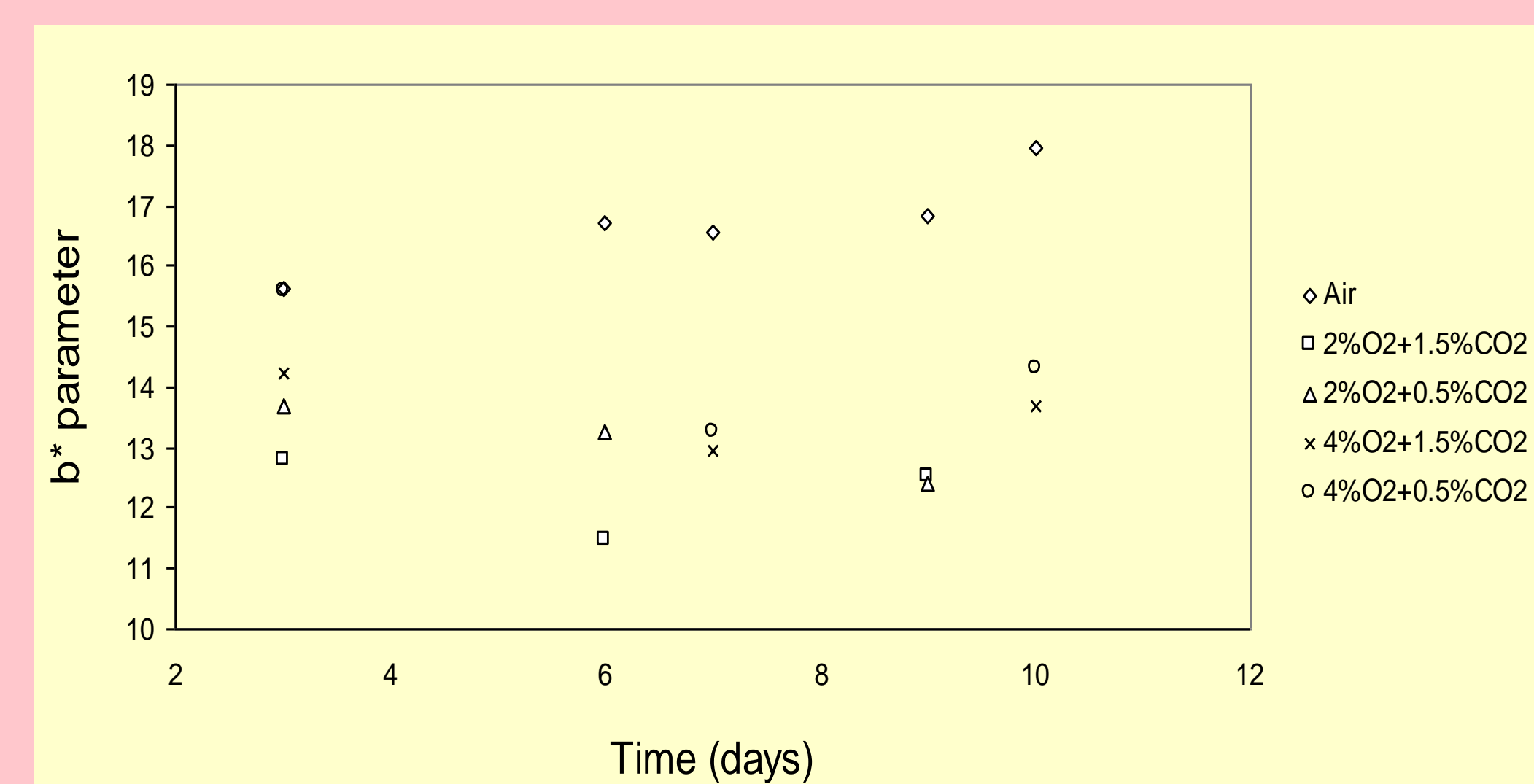
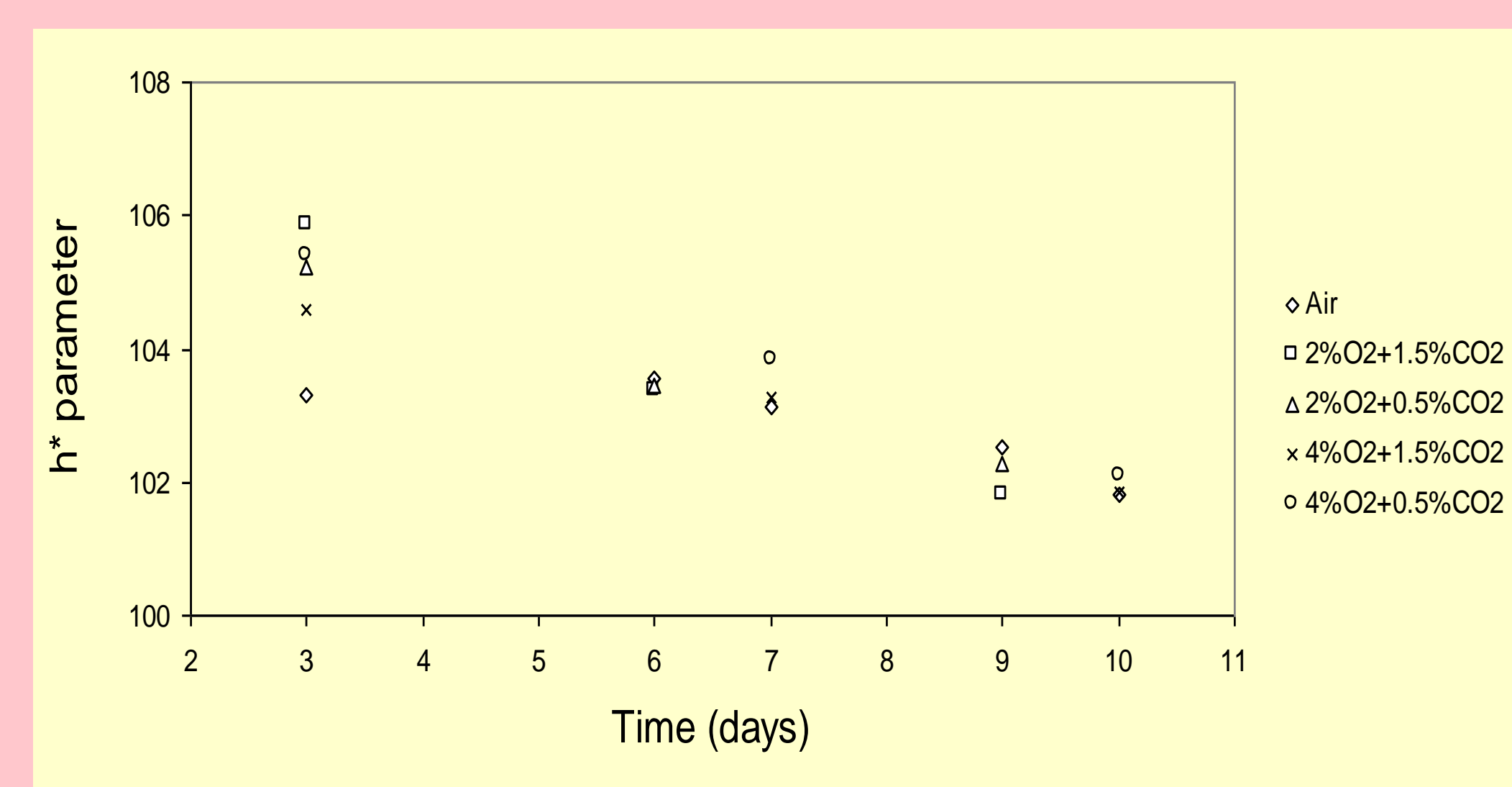


Figure 2. Colour parameters of 'Rocha' pear after seven months of storage in controlled atmosphere and exposure to air at room temperature (19-20°C)

CONCLUSIONS

From the PPO and colour results, it is clear that the samples had been stored under CA presented lower susceptibility to become brown in comparison with the controls. However, among the conditions tested, no particular CA condition seems to be the best in terms of colour preservation.

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