Effect of controlled atmosphere packaging on overall quality of wonderful pomegranate

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INTRODUCTION

The cold storage of fruits is a key step to guarantee the product quality. However, temperatures below 5°C could cause chilling injury, browning, husk pitting and discoloration of pomegranates. Controlled atmosphere could help to delay the loss of quality and thus extend the shelf life of fresh fruit due to a reduction in respiratory activity, ripening, softening, incidence of physiological disorders and pathogen growth (Palou et al., 2007).

OBJECTIVE

The objective of this work was the assessment of two controlled atmosphere conditions (5 % O2 - 5 % CO2 and 5 % O2 - 10 % CO2) on pomegranate overall quality under cold storage (0 and 5°C) during 75 days.

MATERIALS AND METHODS

Selection and cleaning stage
(Sodium hypochlorite 200 ppm x 3 min)

Controlled atmosphere treatments and cold storage

Evaluation after cold storage (each 15 - 30 +2 days)

Evaluation each 15 - 30 +2 days

Weight loss (%)

Chilling injury visual evaluation (scale 0-5)

Color (L*, a*, b*)

Total soluble solids (TSS)

Trittable acidity (citric acid %)

Gaseous atmosphere treatments and storage

Treatment | Gaseous concentration O2(%) + CO2 (%) | Storage Temperature (°C)
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21% O2 + 0% CO2 | 21% + 0% | 0
21% O2 + 5% CO2 | 21% + 5% | 0
5% O2 + 21% CO2 | 5% + 21% | 0
5% O2 + 5% CO2 | 5% + 5% | 5
10% O2 + 10% CO2 | 10% + 10% | 5

RESULTS

The respiratory rate of pomegranates decreased at lower storage temperatures, showing the effect of this parameter on fruit metabolism with values ranging from 4.6-9.9 mg CO2 kg-1 h-1 and 4.8-6 mg CO2 kg-1 h-1 at 0 and 5°C, respectively (Fig. 1). The gaseous combination 5% O2 + 5% CO2 had the lowest respiration rates with values ranging from 4 to 5.6 mg CO2 kg-1 h-1 (0 °C) and 5.9 to 5.1 mg kg-1 CO2 h-1 (5 °C).

No differences were observed between treatments in trittable acidity (1.1-2%) and total soluble solids (12-16%) during storage.

The storage at higher temperatures caused an increase in weight losses with treatments 5% O2 + 5% CO2 and 21% O2 + 0% CO2 showing the lower and higher weight losses, respectively (Fig. 4).

The chilling injury of pomegranates was observed after 30 days in fruit stored at 0°C. This disorder was more evident in treatment 5% O2 + 10% CO2 with 100% of the fruit with moderate damage. While treatments 5% O2 + 5% CO2 and 21% O2 + 0% CO2 showed mild chilling injury with 33 and 67% of pomegranates damaged, respectively. Fruit stored under 5% O2 + 5% CO2, presented only a 33% of the fruit with slight damage at the end of storage (Table 1).

CONCLUSIONS

The controlled atmosphere technology allows to extend the shelf life of cold stored pomegranates until 60+2 days with slight changes in overall quality, weight loss and color (lightness, saturation and hue).

Results showed the feasibility of controlled atmosphere to preserve pomegranates specially when 5% O2 + 5% CO2 treatment was applied during storage at 5 °C.

REFERENCES