Wrapping Materials and Cold Storage Durations Effect on Total Soluble Solids of Nectarine

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Abstract: Three wrapping materials (news paper + straw, kraft paper and kraft paper + straw) and five cold storage durations (0, 8, 16, 24 and 32-day) were investigated for total soluble solids (TSS) of nectarine (cv. Moghan) during cold storage at -1°C temperature and 98% relative humidity. The experiment was laid out in Factorial Completely Randomized Design (FCRD) with four replications for each one of factors. The data collected were subjected to Analysis of Variance (ANOVA) and Duncan’s Multiple Range Test (DMRT) at 1% probability was performed to compare the means of different treatments. The statistical results of the study indicated that although wrapping material had no significant effect (P > 0.01) on TSS, cold storage duration significantly (P < 0.01) affected it. Results of the study also indicated that TSS increased by increasing cold storage duration. In addition, kraft paper was the best wrapping materials for protecting TSS.

Key words: Nectarine • Wrapping material • Cold storage duration • Total soluble solids

INTRODUCTION

Peaches and nectarines are rich in ascorbic acid, carotenoids and phenolic compounds that are good sources of antioxidants. Currently, world production of peaches and nectarines stands at 11 million tones, with the three major producing countries being China, Italy and the United States in the Northern hemisphere and Chile, South Africa and Australia in the Southern hemisphere. Different combinations of fruit types, i.e. peach or nectarine, clingstone or freestone, yellow or white flesh, low, medium or high acidity, are available as freshly harvested fruit from April through September in the Northern Hemisphere and from November to March in the Southern Hemisphere [1].

Methods that are being used to preserve whole fruits and vegetables during storage and marketing are generally based on refrigeration with or without control of composition of the atmosphere [2, 3]. However, temperature, atmosphere, relative humidity and sanitation must be regulated to maintain quality of them [4, 5]. In this direction, several methods that have been used are refrigeration, controlled atmosphere packaging, modified atmosphere packaging and chemical preservatives [6-8]. The most prevalent method is rapid cooling at a low temperature with high relative humidity [9]. However, low temperature storage is not economically feasible in most developing countries [3, 10].

Fungicides control postharvest decay of whole fruits, but they leave residues that are potential risks to humans and the environment [10]. In addition, many consumers are suspicious of chemicals in their foods, especially in fruits and vegetables [7]. Sulfites were effective chemical preservative as they were both inhibitors of enzymatic browning and antimicrobial. But their use has been banned due to adverse reaction in consumers [7, 11]. Moreover, chemical preservatives affect the flavor of fruits and vegetables [12].

Coatings, films and wrapping materials are also effective in reducing desiccation (moisture loss), but are subject to microbial growth and disposal problems [8, 13]. Many years of research are conducted to develop a material that would cover fruit so that an internal modified atmosphere would develop [14, 15].

In this paper, the effect of wrapping material and cold storage duration on total soluble solids (TSS) of nectarine (cv. Moghan) during cold storage at -1°C temperature and 98% relative humidity is reported.
MATERIALS AND METHODS

Plant Materials: Nectarines (cv. Moghan) were purchased from a local market in Karaj, Iran. They were visually inspected for freedom of defects and blemishes. Nectarines were then wrapped in different wrapping materials (news paper + straw, kraft paper and kraft paper + straw), placed in plastic boxes and stored in cold storage at -1°C temperature and 98% relative humidity for 0, 8, 16, 24 and 32 days.

Total Soluble Solids (TSS): The TSS of nectarines was measured using an ATC-1E handheld refractometer (ATAGO, Japan) at 20°C temperature (Fig. 1).

Statistical Analysis: The experiment was laid out in Factorial Completely Randomized Design (FCRD) with three wrapping materials (news paper + straw, kraft paper and kraft paper + straw) and five cold storage durations (0, 8, 16, 24 and 32-day) at -1°C temperature and 98% relative humidity with four replications for each one of factors. The effect of the factors on TSS was determined by analysis of variance (ANOVA) using SPSS 12.0 (Version, 2003). Also, Duncan’s Multiple Range Test (DMRT) at 1% probability was performed to compare the means of different treatments.

RESULTS AND DISCUSSION

Although wrapping material had no significant effect (P ≥ 0.01) on TSS of nectarine, cold storage duration significantly (P < 0.01) affected it (Table 1). Anyway, the highest TSS of 10.98% was observed in kraft paper and lowest (9.977%) in news paper + straw and wrapping material affected TSS in the order of kraft paper > kraft paper + straw > news paper + straw. Also, the highest TSS of 11.25% was observed in 32-day and TSS initially decreased and then increased with increased cold storage duration (Table 2). Moreover, interaction of wrapping material × cold storage duration had no significant effect (P ≤ 0.01) on TSS (Table 1). The study of wrapping material and cold storage duration combinations on TSS showed that in news paper + straw, TSS had the highest value (10.80%) in 16-day and the lowest value (9.150%) in 8-day. Also, in kraft paper, TSS had the highest value (12.75%) in 24-day and the lowest value (9.300%) in 8-day. Besides, in kraft paper + straw, TSS had the highest value (11.05%) in 32-day and the lowest value (8.650%) in 8-day. In addition, the maximum mean value for TSS (12.75%) was observed in 24-day of kraft paper and the minimum mean value for TSS (8.650%) was observed in 8-day of kraft paper + straw (Table 3). These results are in agreement with the previous studies on the effect of wrapping materials on the TSS of nectarines.
with those of Smith and Stow [2] and Rashidi et al. [16] who concluded that coatings, films and wrapping materials significantly affected TSS. These results are also in line with the results reported by Park et al. [14, 15], Rashidi et al. [16], Hussain et al. [17], Bahri et al. [18] and Niari et al. [19] that TSS significantly increased by increasing cold storage duration.

CONCLUSION

Although wrapping material had no significant effect (P ≤ 0.01) on TSS of nectarine, cold storage duration significantly (P ≤ 0.01) affected it. Also, TSS increased by increasing cold storage duration. In addition, kraft paper was the best wrapping materials for protecting TSS.

REFERENCES
