

Evaluation of Postharvest Quality Changes of Fresh-Hulled Pistachios During Cold Storage

Abdollahif Sheikhi, Visiting Scholar, Department of Plant Sciences, UC Davis

Carlos Crisosto, Extension Specialist, Department of Plant Sciences, UC Davis

Louise Ferguson, Extension Specialist, UCCE, UC Davis

INTRODUCTION

Pistachios can be consumed fresh, dried and roasted. There is a growing market for fresh pistachio nuts because of their essential micro-nutrients and bioactive constituents. The quantity of these health-promoting phytochemicals are influenced by various factors and practices—genetics (cultivar), environment (soil, radiation, precipitation, humidity), cultivation practices (irrigation, fertilization), and harvest and postharvest processing (time of harvest, drying, roasting). Three days of sun drying has been demonstrated to decrease anthocyanins by 60 percent and vitamin E by 38 percent as well as phenolics, flavonoids. This demonstrates fresh pistachios are nutritionally superior.

Pistachio nuts are traditionally consumed fresh in Iran. In Australia, most pistachios are marketed dried, but a small portion is marketed fresh. This is an option for small growers far from a processing facility, when the trees are young and production is low. Marketing pistachios as a fresh fruit is a value-added alternative. Fresh pistachio nuts are very perishable because metabolic activities, respiration and ethylene production, continue after harvest and produce senescence and changes in pigments, texture, aroma, carbohydrates, amino acids, fatty acids, bioactive compounds, secondary metabolites and other quality components. Nuts, with their high polyunsaturated lipid content, are particularly susceptible to the oxidation that produces off-flavors. Due to all these factors, postharvest storage of fresh pistachios is challenging. Despite the economic importance of pistachios, little is known about the senescence and quality changes of fresh pistachios during postharvest storage.

The immediate objective of this study was to develop baseline information for evaluating quality changes in fresh pistachios under two different postharvest conditions: cold storage with and without Modified Atmospheric Packaging (MAP). The long-term objective is to develop an alternative marketing outlet for California pistachios.

METHOD

Fresh-hulled Kerman pistachios, from a commercial California orchard, were harvested September 18, 2017. This experimental design was a factorial based on a Completely Randomized Design (CRD) of 4 replications that would evaluate the effects of cold storage (60 days) had on the quality of freshly hulled pistachios, using a nonpackaged control and modified atmosphere packaging (MAP). The fruit quality parameters of firmness, decay and weight loss were analyzed during first 30 and 60 days at 0 °C and 90 ± 4% relative humidity. This trial is continuing and will terminate with an organoleptic taste and sensory evaluation at 90 days.

RESULTS

The freshly harvested kernels lost both firmness and weight during the 60 days of storage in the control versus the MAP treatment. The firmness dropped from 7.62 to 6.05 N, and weight loss was 5.34 percent and 0.43 percent for the control and MAP treatments, respectively, after 60 days of storage.

In fresh pistachios, microbial growth on the shell and kernel surface are major indicators of decay. Decay in the control treatment was significantly higher than in the MAP treatments: 90.44 percent of the control treatments exhibited visible mold versus the MAP treatment's 0.35 percent. See Fig. 1 below.

CONCLUSION AND APPLICATIONS

In conclusion, fruit decay, mold growth, firmness and weight loss are the most important quality factors that should be considered in fresh pistachio quality, postharvest. These results demonstrate the decline in kernel firmness and weight, and increase in decay, during 60 days of postharvest storage at 0 °C and 90 ± 4% relative humidity. The MAP treatment decreased weight loss and fruit decay significantly (Fig 1). At 90 days the physiological and metabolic changes, and organoleptic quality will be determined.



Fig 1. Effect of MAP (left) and control (right) on decay and mold growth of fresh hulled pistachios after 60 days of storage at 0 °C and 90 ± 4% relative humidity