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Recommended Citation  
Dawson, Paul; Al-Jeddawi, Wesam; and Rieck, James, "The Effect of Different Freezing Temperatures and Long-Term Storage on The Stability of Peaches" (2019). *Graduate Research and Discovery Symposium (GRADS)*. 276.  
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The Effect of Different Freezing Temperatures and Long-Term Storage on The Stability of Peaches

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Abstract

Freezing is a simple method to preserve foods, especially fruits. The purpose of this research is to determine the impact of long-term freezing storage on peaches quality (physical and chemical attributes). Peaches (Prunus persica) were cut into 8 lengthwise slices and dipped in 2% of ascorbic acid for 2 minutes. The slices were then drained and packaged using Whirl Pak (Nasco). The bags were closed, and tabs were folded over three times. Fresh and pre-frozen peaches treatments were placed randomly into freezers at different freezing temperatures (-7°C), (-12°C), (-18°C), (-29°C) and (-77°C) for 360 days. Quality measurements included freeze, thaw and weight loss, lightness, firmness, moisture content, pH, ascorbic acid equivalent antioxidant capacity (AAEAC), enzymatic detection using gas chromatography (GC), scanning electron microscopy (SEM) and sensory evaluation. The results showed that -77°C and -29°C kept the quality of peaches samples after freezing. However, all samples enzymatically browned, therefore, frozen peaches are best used for applications where they can be used in the frozen state and before thawing. Freezing at -7°C had a negative impact on peaches quality. Fresh and pre-frozen peaches were no preferred by after 270 and 360 days of frozen storage.

Introduction

Fruits grow only in certain parts of the world under specific temperature, humidity environments and times of the year. Fruits contain approximately 90% water which begin to undergo higher rates of respiration once they are harvested, resulting in moisture loss, quality deterioration and potential microbial spoilage [1]. Refrigeration slows down the respiration of fruits and allows for longer shelf lives [1]. Fruit for freezing is usually harvested while still firm and then ripened under controlled storage conditions at temperatures below 0°C if extended shelf life is required. The limiting shelf life factor is the browning [2]. Freezing has been successfully employed for the long-term preservation of many foods by lowering temperature to -18°C or lower [1]. Fast freezing leads to insufficient time to remove the moisture from the cell through osmosis. The cell contents cool then ice forms within the cell. While slow freezing leads to adequate time for water to leave the cell. Therefore, it may be for this reason that drip loss is often more marked in slowly frozen fruits [2]. Because of cell wall damage due to freezing process, the water does not return to the cells upon thawing but, rather, becomes drip loss [2]. Freezing retards the chemical, physical and biochemical reactions which induce phytochemical deterioration. Six to 8% of peaches produced are processed as frozen peaches [4]. During freezing most liquid water is transformed into ice which reduces microbial and enzymatic and lipid oxidation reactions. Enzymatic reactions are a common concern in the deterioration of frozen fruits, despite being very slow. Enzyme activity has been noted in foods stored at temperatures as low as -73°C. Color loses in frozen vegetables which contain chlorophyll because the photheoptization which occurs when the magnesium found in the center of the pheophytin ring is replaced with hydrogen. This reaction is caused when pH decreases during frozen storage thus initiating the photheoptization reaction. Texture is another key factor in fruit quality. The purpose of this research is to determine the effect of long-term freezing storage on peaches quality.

Materials and Methods

Freezing at -7°C and -29°C kept the quality of peaches samples compared to other freezing temperatures, however, -77°C was significantly lower in weight loss and pores size than other freezing/holding temperatures. No significant difference between freezer -77°C and -29°C was found in antioxidant capacity. Thawing after freezing negatively affected weight loss, PPO enzyme activity, texture deterioration and color for all temperatures.

Results

Conclusion

Acknowledgment

This research was partially supported by a graduate student fellowship from Electrolux Corporation.

References


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