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Potential of Sea Water and Lime as Pre-Treatments on the Removal of Testa and Other Postharvest Qualities of Cashew (*Anacardium occidentale* L.) Nut Kernel

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ABSTRACT

The study was conducted to identify the best seawater and lime concentrations on the removal of testa, discoloration, and other post-harvest qualities of cashew nut kernel and to perform the cost analysis of different treatments. Kernels soaked in 60 % seawater significantly absorbed less seawater solution with 22.48 grams compared to other treatments. The use of seawater from 20-100 % concentrations significantly hastened the disintegration of the membranes of the testa, which facilitated easy removal of the testa.

The color quality of the kernels was all ivory-white which exhibited no discoloration on the surface of the kernel after soaking with different concentrations of seawater. Polyphenol content was found to be weak in those kernels treated with seawater. Pure water as pretreatment of whole kernel with testa was observed to be most expensive due to labor incurred in removing the testa.

Lime treatments ranging from 10-50 % significantly enhanced the removal of testa of the whole nut kernel due to lesser number of minutes consumed during the operation. Thirty percent (30%) lime solution showed significant recovery of fresh whole kernels. The highest weight of dried whole kernels was also observed from the 30% lime solution.

Keywords: cashew, testa removal, cashew nut pre-treatment, lime, seawater

INTRODUCTION

The cashew (*Anacardium occidentale* L.) kernel valued as cashew nut in trade is covered with thin, brittle layer and reddish-brown skin called testa. The testa has been reported to be a good source of catechol type tannins (Madhaven-Pillai et al., 1963), Leucocyanadin (Bate-Smith, 1954) and polyphenols and heavy metal-like-iron. The same findings were reported by Donath (1962) and Chandler (1964). Studies of Mathew and Parpia (1970) showed that the black discoloration is due to the complex formation between polyphenols and iron found in testa.

Because of the close contact of the testa with the kernel, the water constituents of the testa may reach into the kernel. Contamination which leads to

the formation of black discoloration on the surface of the kernel is identified during the decortication or splitting process. The taste is likewise affected, as such, kernels do

The export potential of cashew kernel remains high, however, the quality of the product remains low. This could be attributed to the crude method of processing the cashew nut which requires too much handling. Thus, polyphenol contamination of the kernel could not be prevented or avoided. cashew nut shell liquid (CNSL) is hazardous to health. It causes cancer and burning of the skin (FNB, 1983).

Due to limited information, it is therefore, worthwhile to investigate the effect of seawater and lime on the removal of testa in relation to the quality of the cashew kernel.

METHODOLOGY

The study was conducted at the Research Laboratory of the Department of Research and Extension, State Polytechnic College of Palawan (now, Western Philippines University), Aborlan, Palawan from August 2001 to October 2001.

Study 1. Potential of Seawater Pretreatment on the Testa Removal, Discoloration and other Postharvest Qualities of Cashew Nut Kernel

Seawater at desired concentrations (0-100%) were prepared. Distilled water was used as solvent. The sample kernels (100g) were soaked in the solution and constantly stirred for 2 hours with the use of a wooden paddle. The kernels were collected from the solution by a strainer and placed in the plastic basin. The testa of the kernel was carefully removed by hands to avoid split kernel and polyphenol contamination.

The study was laid-out in a randomized complete block design with three replications and six treatments. The treatments (concentrations) were the following: 0% seawater, 20% seawater, 40% seawater, 60% seawater, 80% seawater and 100% seawater. The data on time consumed in testa removal, color quality, amount of seawater solution absorbed, weight of fresh and dry kernels, weight of fresh and dry tests, testa-kernel ratio, and saltiness of the kernel were collected.

Study 2. Potential of Lime Pretreatment on the Testa Removal, and other Post Harvest Qualities of Cashew Nut Kernel

A one hundred grams (100g) of whole kernels in each treatment was used in the experiment. The kernels were soaked in lime solutions with varying concentrations (1%-50%) and stirred constantly for one hour using wooden paddle. The kernels were collected from the solution by a strainer and placed in a tray and was dried under the sun for 30 minutes.

A randomized complete block design (RCBD) was used. With three (3) replications and six (6) treatments. The following treatments were used: 0% lime, 10% lime, 20% lime, 30% lime, 40% lime and 50% lime. The data gathered includes color quality, amount of lime solution absorbed, weight of kernels based on color quality, number of whole, split and broken kernels, and sensory evaluation on the taste of kernel.

RESULTS AND DISCUSSION

Potential of Seawater Pretreatment on the Testa Removal, Discoloration and other Postharvest Qualities of Cashew Nut Kernel

Kernel; soaked in 0% seawater (pure water) significantly absorbed the greatest amount of water (40.36 g) than those treated with 20-100% seawater concentrations with a mean ranging from 22.48-30.96 g. It was also found out that seawater concentration of 20% which ranked second also statistically differed from the other concentrations. No significant differences were observed among 40, 80 and 100% seawater. Kernels soaked with 60% seawater absorbed the lowest mean seawater solution (22.48 g) and was significantly different from the other concentration used. The rapid absorption of water by the testa could be attributed to the lower degree of impermeability of the seed coat or testa to oxygen or to both (Vaugmann and Whitehouse, 1971).

Pure freshwater (0% of seawater) consumed the highest number of minutes in removing the testa of the kernel having a mean of 38.83 minutes. The lowest was found in 100% seawater (33.17) minutes) while concentrations 20%-80% seawater obtained a mean ranging from 33.33 – 36.83 minutes. It could be observed that cashew kernels treated with 20 to 100% seawater had lesser time consumed in removing the testa than those kernels with 0% seawater. Treatment means differed significantly from the control. Also the finding conformed with the study of Dela Cruz (1997) which stated that dipping cashew nut kernel in saltwater hastened the disintegration of the membranes of the testa which facilitated easy removal of testa.

On the weight of kernels after testa removal, results revealed that kernel treated with 0% seawater absorbed a larger amount of liquid than those treated with seawater. It might be possible that the presence of elements like sulfur and magnesium in seawater (Ells, 1963) might control or hinder the absorption of the solution into the inner layer of the kernel, however, all the treatment means remained to be significantly the same. The result implied that the solutions penetrated or reached into the kernel that increased its weight despite the closer contact of the testa with the kernel.

On the other hand, concentrations from 20% to 100% seawater (81.85-83.32 g) were found to be significant over 0% seawater in terms of total dry

weight of kernels which obtained a lowest mean of 77.55g. The seawater concentrations showed no significant differences from each other. This result shows that kernels treated with seawater before testa removal are heavier than those treated only with water. This means that larger amount of water in kernel treated with 0% seawater was lost than those treated with 20 to 100% seawater. It might be also possible that the presence of elements like sulfur and magnesium in seawater (Ells, 1976) control of hinder the absorption of the solution into the inner layer of the kernel.

On the total fresh weight of testa, results revealed that 0% to 40% seawater obtained a mean ranging from 22.39 to 19.66 g. These concentrations differed significantly from concentrations of 60 to 100% seawater having a mean ranging from 15.76 to 16.89g. It can be noted from the results that increasing the concentration of seawater from 60 to 100% significantly lowered the fresh weight of testa. The use of seawater treatment as soaking solution on the dry weight of testa showed no significant differences as exhibited by a weighted mean average ranging from 7.96 to 8.99g

On the fresh testa-kernel ratio, the different treatments above 60% seawater showed no significant differences from each other however, they differed significantly from the concentrations of 0% to 40% seawater having a mean ranging from 5.02:1g and 5.22:1g, respectively. Likewise the dry tests-kernel ratio did not vary significantly. The weight of kernel over testa in 100% seawater appeared to be lower than the other concentrations used. However, different patterns were observed on the dry weight kernel-testa ratio as compared to the fresh testa ratio.

On the color quality, soaking the cashew kernel at various seawater concentrations before testa removal did not affect the color quality of the kernel.

The results likewise indicated that saltiness of cashew kernels was affected by the different concentrations of seawater. Although treatment means showed significant differences from each other, mean saltiness ranged only from 4.06 to 4.67 which is between 4 (mild) and 5 (weak) based on sensory evaluation.

A similar finding reported by Greenway and Munns (1980) was observed in polyphenol evaluation. The rating of the panel ranged from 4.05 to 4.34. The index value was considered mild. It is also worthwhile to note that irrespective of the seawater concentration, polyphenol contamination of the kernel was very low.

Potential of Lime Pretreatment on the Testa Removal, and other Post Harvest Qualities of Cashew Nut Kernel

Results on lime pretreatment showed that cashew kernels soaked in 30% lime absorbed more solution (54.26g) than the other concentrations used. The lowest was found in 0% lime with a mean of 44.35g. However, all the concentrations with lime differed significantly from 0% lime solution. It was observed further that the testa of kernel became harder and more brittle after soaking in the solution. The hardening of testa could be attributed to Calcium present in the lime. This hardening of testa facilitates its easy removal and the data indicated that concentrations of 10 to 40% lime was found to be the most appropriate and economical to use.

On the fresh weight of kernel after testa removal, the data showed that a large amount of solution was absorbed by the kernel treated with 40% lime, the lowest was found in 20% lime, however, the comparison among the tested concentrations did not statistically show significant differences. Likewise the different treatments used did not affect the dry weight of kernels.

As expected the lime has affected fresh and dry weight of testa. The testa of cashew kernels treated with lime were significantly heavier than the control. Likewise the dry weight testa soaked in a solution with 40 to 50% lime was significantly higher than those concentrations having 0 to 30% lime.

On the fresh testa-kernel ratio , highest mean weight of kernel over testa was observed in 0% lime 4.71 kernel to 1 gram testa which was found to be significantly different from 10 – 50% lime with the mean ratio ranging from 3.97 to 4.26g kernel to 1g testa. Likewise the dry testa-kernel ratio of 0% lime (11:1g) was significantly higher than the concentrations of 10 to 50% lime. However, concentrations with 10 to 50% lime were statistically the same having a mean ranging from 7.27 to 7.95:1 g testa. The data indicated that increase in weight of testa is could be due to the adherence of lime to its surface.

The evaluation of saltiness and polyphenols revealed that soaking cashew in a solution with 0 to 50% lime did not affect the taste of cashew kernel as far as polyphenols is concerned. De Leon and Castro (1979) reported that food grade lime is used as food additive added intentionally to food generally in small quantities, to improve appearance, texture or storage properties. Likewise, it improves the sensory characteristics and maintains the nutritional quality of foods.

RECOMMENDATIONS

Seawater treatments with a concentration of 60% seawater is effective in the removal of testa of cashew whole kernels and improved some other post harvest qualities of cashew such as taste and color quality of the kernel.

The use of lime as soaking solution facilitated the removal of testa, however, further investigation should be dome on the kernel contamination. Similar studies using other indigenous material that could improve the quality of cashew kernel is highly suggested.

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