

METHODS OF BLEACHING WALNUT JUGLANS REGIA L

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Abstract: Experimental studies were conducted to test methods for bleaching nuts in shell. As bleaching agents used were sodium hypochlorite and sodium bicarbonate, hydrogen peroxide and sodium hypochlorit, hydrogen peroxide. It was found that the most effective bleaching agent is hydrogen peroxide. It has been identified and applied analytical method for determining the degree of white nuts in shell, namely the method of determining the degree of white wheat flour.

Key words: nuts in shell, bleaching agents, the degree of white.

Introduction

Nuts sector in Moldova has grown considerably since its formation in the early 90s. From a non-commercial inherited from the Soviet period, it was transformed into a major export sectors of the country - a success story in the economy of Moldova. Moldova is one of the leading European and international market for exports of nuts, according to the International Trade Centre in Geneva. Annually, Moldova exports around 9000 tonnes of nuts, as this indicator only making way for the United States of America, Mexico and China. The largest importers of Moldovan nuts are France, Turkey, Austria, Greece, Germany.

It is now time to recognize and perceive the nuts as an industry in the context of a larger global economy and identify constraints to be addressed to ensure permanent competitive development. One of them is the quality and safety nuts. Considering that Moldova exported annually amounts of nuts in shell one of the most important requirements submitted by other European customers is appearance (color) of shell nuts [1,2]. In HGO technical regulations 174/2009 are specified skin defects, affecting the appearance, such as color change- color spots or uncharacteristic comprising 20% of the shell surface and having a brown color, reddish brown, gray or another color, contrasting with the rest of the shell net or the majority of shells in the lot, dirt, sticky soil that contains more than 5% of the shell surface adhering husk comprising over 10% of the shell surface husking - pronounced marks on the shell, resulting in operation of mechanically removing the husk. Also, HGO technical regulations 174/2009 provides that intact nuts, with green sheel peeled, are washed and whitened with solutions that ensures their quality.

But the problem is that industrial plantations have been planted in recent years have not yet entered into fruit. Fruit trees that give us fruits the last 15 years are those that grow through farmyards, along roads and protective strips. These trees are not cared at all. Moreover, the pursuit of profit, the harvest is gathered before term, peel the inappropriate conditions without being washed and bleached, dried forced, thereby diminishing the quality. One of the most important technological operations that determine the appearance of walnuts in shell and core quality is bleaching. Taking into account the above, the purpose of the paperwork is research data for whitening methods of nuts in shell, and identification of an analytical method for determining the degree of whiteness.

Materials and methods

Experimental research were done on nuts in shell, crop 2011. Experimental samples were kept at room temperature. Following indices were determined: taste and whiteness. As bleaching agents were used hydrogen peroxide, sodium hypochlorite, sodium bicarbonate, acetic acid.

Samples were immersed in solutions of bleach and maintained for 1-10 min., at temperatures between 20-45°C. Whiteness was determined by the Photocolorimeters method of determining the grain flour color [3]. Photocolorimeters method is based on determining reflectivity of the sample surface compared to a standard flour using filter wavelength of 460 nm. Color is expressed in conventional units. For determinations nut shells were finely chopped, similar to wheat flour.





Results and Discussion

There were tested three methods namely, bleaching with sodium hypochlorite and sodium bicarbonate, hydrogen peroxide and sodium hypochlorite, hydrogen peroxide.

Treatment method with sodium hypochlorite and sodium bicarbonate is a classical method. The experiment was performed at temperature $t = 22 \pm 10^\circ\text{C}$, for during 1-5 min. After treatment nuts are whitened uniformly pale brown color, integral outer structure, but the disadvantage of the method was observed chlorine odor and white spots on the surface of nuts.







Better results were obtained by adding vinegar in bleach solution, chart 1.

Chart 1. Image of nuts treated with sodium hypochlorite, sodium bicarbonate, acetic acid

Sample name	Sample picture	feature
blank		Brown color, integral structure.
Treatment with sodium hypochlorite, sodium bicarbonate		Pale brown color, integral aspect, white spots on the surface
Treatment with sodium hypochlorite, sodium bicarbonate, acetic acid (0.5%)		Pale brown color, integral aspect, white spots on the surface
Treatment with sodium hypochlorite, sodium bicarbonate, acetic acid (1%)		Pale brown color, integral aspect, odor.

Hydrogen peroxide is a strong oxidant that has shown good bleaching activity. The experiment was performed at temperature $t = 22 \pm 10^\circ\text{C}$, during 1-10 min., the concentration of 35%. The results are presented in chart 2.





Chart 2. Image of nuts treated with hydrogen peroxide

Retention time in the bleach, min	Sample picture	whitened walnut feature
blank		Pale brown color
2		within 2 min., nuts evolving insignificant appearance, but all tests turn white uniform, with pale brown color.
4		Nuts whitened uniformly pale brown color, the outer structure integral.
6		Nuts whitened uniformly pale brown color, the outer structure integral.
8		Nuts whitened uniformly pale brown color, the outer structure integral.
10		Nuts whitened uniformly pale brown color, the outer structure integral.

After treatment with hydrogen peroxide solution can conclude that hydrogen peroxide had a good effect on the whitening process nuts in shell. Analyzing the results of experiment was determined that optimal conditions $\tau = 4$ min at concentrations of 35% hydrogen peroxide.

To improve the process of whitening walnut was applied subsequent treatment with hydrogen peroxide and sodium hypochlorit. The results are presented in chart3.

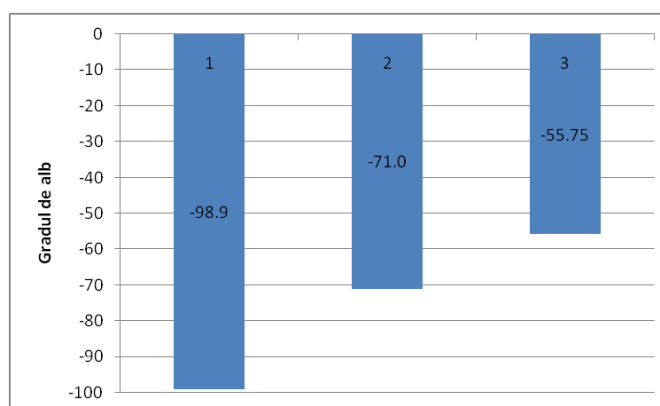
Chart 3. Image of nuts treated with hydrogen peroxide and sodium hypochlorit

Treatment parameters	Sample picture	Sample description
NaClO (t =45 ⁰ C, concentration 750 g Cl active, τ =30 s), H ₂ O ₂ (t =22 ⁰ C, concentration 35%, τ =1 min.)		Light brown with dark tint
NaClO (t =45 ⁰ C, concentration 750 g Cl active, τ =40 s) H ₂ O ₂ (t =22 ⁰ C, concentration 35%, τ =1 min.)		whitened walnut surface until light brown.
NaClO (t =45 ⁰ C, concentration 750 g Cl active, τ =50s), H ₂ O ₂ (t =22 ⁰ C, concentration 35%, τ =1 min.)		Light brown area with a shade sharper than the previous sample. Chlorine odor persists.
NaClO (t=45 ⁰ C, concentration 750 g Cl active, τ =60s), H ₂ O ₂ (t =22 ⁰ C, concentration 35%, τ =1 min.)		whitened sample, natural color. Pungent odor of chlorine.

Bleaching process was successful, there was nuts discoloration to a clearer shade, close to the natural color of walnut. Analyzing the results of experiment was determined that optimal conditions are NaClO (t =45⁰C, concentration 750 g Cl active, τ =40 s) and H₂O₂ (t =22⁰C, concentration 35%, τ =1 min.).

According to bleaching tested solutions can be distributed (arranged) in the following sequence: sodium hypochlorite and sodium bicarbonate <hipochlorit hydrogen peroxide and sodium <hydrogen peroxide.

Commercial aspect of nuts is the main criterion on which we focused in work time. As an analytical index for assessing the degree of white was selected method used for determining grain white flour. Obtained results on the whiteness of nuts are shown in figure 1.

**Fig. 1.** White high index values of walnuts in shell

Experimental data in fig. 1. perfectly correlated with organoleptic assessments results presented in Table 1, 2, 3, which shows the possibility of applying the method of assessing the degree of white flour and the nuts in shell quality assessment.

Conclusion

1. After effective action whitening preparations tested can be distributed (arranged) in the following sequence: sodium hypochlorite and sodium bicarbonate <hipochlorit hydrogen peroxide and sodium <hydrogen peroxide.
2. Has been identified and applied the method of determining the degree of white which is used for evaluating the quality of flour. The results of treatment are: treatment with hydrogen peroxide (-55,75 u.c.), treatment with hydrogen peroxide and sodium hypochlorite (-71,0 u.c.), blank (-98,9 u.c.).

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