

# Walnut Meal Whitening and the Impact of Whitening Factors on Its Quality

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**How to cite this paper:** Carolina, G., Rodica, S., Turcanu, D., Eugenia, C. and Olga, G. (2021) Walnut Meal Whitening and the Impact of Whitening Factors on Its Quality. *Food and Nutrition Sciences*, 12, 1-12. <https://doi.org/10.4236/fns.2021.121001>

**Received:** December 4, 2020

**Accepted:** January 15, 2021

**Published:** January 18, 2021

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## Abstract

Walnut meal is a nutrient-rich product and has a high nutritional value. Walnut meal is a product that can be used in food technology, in order to improve the nutritional quality, expand the range of confectionery products, and replaces the walnut kernel. Due to the dark color, the use of the walnut meal in the preparation of pastries would have a negative effect on the appearance of some final products and the whitening process would allow its use without negatively influencing the final product. The aim of the research is to whiten *Juglans regia L.* walnut meal as a valuable nutritious raw material. Hydrogen peroxide was used to bleach the walnut meal, and the pH, concentration of the whitening agent and the concentration of the meal were used as variable parameters of the bleaching process. The color descriptors (Whitening index, Saturation index, Total color difference, Browning index) were calculated to establish the optimal whitening conditions of the walnut meal. The obtained results showed that an alkaline medium, with the hydrogen peroxide concentration of 10% and 2.5% meal concentration allows obtaining the best color parameters in terms of Lightness (82.20) and Whitening Index (71.20). In addition, the study of walnut meal quality in terms of peroxide value evolution showed that the treatment with hydrogen peroxide does not affect in any way the value of the peroxide index of the lipids. The highest peroxide value (4.91 mmol/g oil) was recorded for the sample bleached in a 10% Hydrogen peroxide solution, with a pH of 10 against the 4.71 mmol/g oil for the unbleached sample.

## Keywords

Walnut Meal, Whitening, Color Parameters

## 1. Introduction

Walnut, a nut plant with the scientific name *Juglans regia L.*, is the most favorable crop for temperate regions [1]. There is a great diversity of walnut genotypes that differ in terms of forestry, productivity, physical and chemical characteristics of nuts. The nutritional importance of walnut is related to the seed (core) [2] [3]. Walnuts are among the most widely consumed and commercially grown in the world, have many health benefits, including reducing the risk of cardiovascular disease, the treatment of type II diabetes and the prevention and treatment of certain cancers and reducing age-related symptoms and other neurological disorders [4] [5] [6] [7].

*Juglans regia L.* nuts are widely used in human nutrition and considered as strategic foods, included in the FAO list of priority plants [8]. Walnut kernels are a very concentrated food, with an energy value of 650 - 700 kcal/100g, much higher than all foods of plant origin [9]-[14]. Walnuts are commonly found in our diet and have been known for their nutritional properties for a long time. Walnuts have traditionally been known for their lipid profile, which has been linked to a wide range of biological properties and health-promoting effects [15] [16] [17] [18].

The walnut oil extraction residue—meal, is rich in protein (unusually rich in arginine, glutamic and aspartic acids) and has been used in the formulation of various functional foods [19]. Walnut meal is a valuable product, but after pressing and storage it acquires a less attractive appearance and this negatively influences the organoleptic characteristics of food products where the use of walnut meal is essential [16] [20] [21]. After pressing, the walnut meal has a gray-yellow color and after storage, the color intensifies. Its use as an ingredient for food would negatively influence the color of the products, so its whitening would be a reasonable way, and the whitened meal would be an ideal ingredient in the preparation of pastries, preserving the aspectual qualities of the product but also enriching them from the nutritional aspect [16] [21] [22].

Given that the specific color of the walnut meal is determined by the chromophores of lignins in the core membrane, some paper whitening agents could be used. Of these, the most convenient seems to be hydrogen peroxide, which has an effective oxidizing agent, non-toxic and environmentally friendly [23] [24].

Hydrogen peroxide is a colorless liquid, used mainly as a whitening agent for different food, including oilseed meals. Upon decomposition, hydrogen peroxide forms water and oxygen and is therefore a clean environmental agent. Whitening involves the neutralization of chromophores in plant cell pigments. Chromophores are a set of alternating conjugated chains with single and double bonds often-containing heteroatoms (other than carbon-nitrogen, oxygen, sulfur, etc.). Thanks to the interaction with light rays, chromophores are responsible for the color of pigments [25].

## 2. Materials and Methods

The choice of the bleaching process was based on Hydrogen Peroxide treatment