



Proximate Composition of Sudanese *Sesamum indicum* L. (white and brown) Sesame seeds

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Abstract

This work deals to study proximate composition of two types of *Sesamum indicum* (sesame) seeds white and brown. The objective of this study is to determine the (moisture, Ash, fiber, fat and protein), the samples were collected from the Sudanese market (Omdurman area) and analyses by method of conduction of proximate composition. The results Showed that there are no different significant and different significant at probability ($p < 0.05$) and it cited that the : (ash = 0.027%), (fat= 0.041%), and (crud fiber = 0.008%).The value of moisture considered higher in white sesame ($5.24 \pm 0.07\%$) than brown sesame ($5.17 \pm 0.06\%$), ash value is higher in white sesame ($4.81 \pm 0.15\%$) than brown sesame ($4.01 \pm 0.07\%$), the crud protein in white sesame and brown sesame are equal ($18.95 \pm 0.14\%$), the fat is lower in white sesame ($47.09 \pm 0.38\%$) than brown sesame ($47.33 \pm 0.90\%$), the crud fiber is lower in white sesame ($5.61 \pm 0.45\%$) than brown sesame ($4.92 \pm 0.25\%$).

Introduction

Sesamum indicum L., known as Sesamum or benniseed, belong to Pedaliaceae family, the species is one of the most ancient oil seeds crop which plays important role in human nutrition by used the seeds for oil extraction and rest for edible purposes (El Khier *et al.*, 2008). The plant seeds were primarily used for oil and wine (Ghandi, 2009). The plant has been grown since the beginning of arable cultivation, and originates from the dry bush savannah of tropical Africa, and spread from there to India and China, where it is still widely cultivated. (Naturland, 2002).Sesame seeds plays an important for food formulation such as halaweh (sweetened tehineh in human nutrition (kanu *et al.*, 2007). The composition of sesame possesses moisture, proteins, fiber, and ash approximately with respect to 100% gm of seeds, the seed contains 54% oil, 20%

protein, 13.4% carbohydrate, 3.2% crude fiber and 3.7% ash (Nzikou *et al*, 2009), Loumouamou B., *at el.*,(2010).The seeds are used for oil extraction and food purposes (Elleuch *et al* 2007).(Borchani C., *at el.* (2010)). The oil composition varies depend on climatic condition, oil type, plant maturity and method of processing.(Ogunlade, I., Ilugbiyin, A., *at el.* (2011) The fruit bunch contains on the average 200nuts.the nut has a very thick, hard shell and contains between three to seven seeds, which have high oil content(Grompone,2005). To determine the proximate composition of the two types of sesame seeds (white and brown).

Materials and methods

The samples of white and brown sesame seeds (*Sesamum indicum*, L) were collected from a local market in (Omdurman area)

Analytical Methods

All the proximate analyses of (Moisture, ash, fat, fiber and protein) were conducted according to AOAC (2005).

Determination of Moisture Content

2g of both brown and white seeds were weight and placing into a pre weighed aluminum dish and dried in a forced –air convection oven at 105°C unit a constant weight was reached, the data reported represents by three determinations for brown and white as below:

$$\text{Moisture (\%)} = ((W2 - W1) - (W3 - W1)) / (W2 - W1) \times 100$$

Where:

W1 = weigh (g) of empty dish

W2 = weigh (g) of sample and dish

W3 = Weight of dish and dry sample

Determination of Fat Content

3-5 g of samples was placed into bottle that was weighed before and take it in to soxhlet, 250 ml of petroleum ether was added and heated at 80-90°C until solvent is completely evaporate. Then the bottle was transferred to cool in desiccators after that the bottle and its dried sample was weighed and calculated as:.

$$\text{Fat (\%)} = (W2 - W1 / W3) \times 100$$

Where:

W1= Weight of empty bottle

W2 = Weight of bottle and oil

W3 = Weight of sample

Determination of Fiber Content

2g of sample were weighed, 200 ml of sulphuric acid was added and heated to boiling for 30 minutes and filtered. The residue was washed three times by using hot water ;100 ml and 50 ml of NaOH were added and heated to boiling for 30 minutes and filtered, then washed carefully three times with hot water until it was free from acid. The sample were dried under suction and transferred to an oven at 105°C overnight and finally weighed. The residue was ashed in a muffle furnace at 550°C for three hours till alight grey ash was formed then weighed to a constant and the total crude fiber percent was calculated by the equation as below.

$$\text{Crude fiber (\%)} = (W1 - W2) / W3 \times 100$$

Where:

W1 = Weight of sample before ignition

W2 = Weight of sample after ignition

W3 = Original sample weight

Determination of Ash Content

Ash content was determined by drying ash method when empty crucible was weighed and 2 g of sample was weighed into crucible, and heated at 550°C in furnace until the sample turns to gray after complete heating the crucible was placed into desiccators to cool, and then the sample was weighed again and calculated as below:

$$\text{Ash (\%)} = (W1 - W2) / S \times 100$$

Where:

W1 = Weight of crucible with sample

W 2 = Weight of empty crucible

S = Weight of sample

Determination of crude protein

kjeldahl method was used to determine the crude protein. 1g of sample was placed in digestion flask ; 5 g of kjeldahl catalyst and 200 ml H₂SO₄ was added and boiled until the solution clears and cooled , 60 ml H₂O was added ;the flask connected to digestion sesame and immersed in standard acid ; 5-7 drops of mixed indicator was added, and heated until all N₂ was distilled after that was titrated with NaOH and calculated as equation below:

$$\text{Protein (\%)} = ((A-B) \times N \times 14.007 \times 6.250) / W$$

Where

A = Volume (ml) of 0.2 N HCL used sample titration

B = Volume (ml) of 0.2 N HCL used in blank titration

N = Normality of HCL

W = Weigh (g) of sample

14.007 = Atomic weigh of nitrogen

6.25= the protein- nitrogen conversation factor.

Result and discussion

The result of the present study was done as table below:

Table-1: Proximate composition (%) of white and brown sesame

Parameter	White sesame	Brown sesame	P-value
Moisture content	5.24 ^a ±0.07	5.17 ^a ±0.06	>0.05 ^{NS}
Ash content	4.81 ^a ±0.15	4.01 ^b ±0.07	0.027*
Crude protein	18.95 ^a ±0.14	18.95 ^a ±0.24	>0.05 ^{NS}
Fat content	47.09 ^b ±0.38	47.33 ^a ±0.90	0.041*
Crude fiber	5.61 ^a ±0.45	4.92 ^b ±0.25	0.008**

Values are mean ±SD. Means having different superscripts are significantly difference at (P≤0.05)

From the Table (1) the moisture content was higher in white sesame (5.24±0.07%) than brown sesame (5.17±0.06%). According to these results there are no difference significantly due to

variety in moisture content of sesame seeds ,this result was agree with Bahkali *et al.* (1993) that reported the moisture content of different cultivars in range (3.65-5.60%). The Ash content was higher in white sesame (4.81±0.15%) than brown sesame (4.01±0.07%), it had difference significantly at (P≤0.05) (0.027), this result was disagreed with Özcan M, Akgül A. (1995) which determined the ash content value between (3.67 and 5.39%) for Turkish sesame seeds. The protein in the white and brown sesame its equal (18.95±0.14%), it have no difference significantly at (P≤0.05); this result was agreed with (Dashak and fali, 1993) which reported that the protein content was found in the range of (18.00 and 23.18%) being the variety with the highest protein content. The fat content was higher in brown sesame (47.33±0.90%) than white sesame (47.09±0.38%), it have difference significantly at (P≤0.05)(0.041) , this result was disagree with (Bennet, M. (2011) which reported that the fat content in the Turkish sesame seeds was (63.25%) .The Fiber was higher in white (5.61±0.45%) but lower in brown sesame (4.92±0.25%), it have difference significantly at (P≤0.05) (0.008); this result was agreed with (Dashak and fali, 1993) which reported that the fiber was in the range of (5.61 and 5.0%).

Conclusions

When analytically investigated the differences in proximate composition of white sesame and brown sesame, the most results showed different significant patterns between the white sesame and brown sesame seeds and moisture, Ash, fiber where higher in the white sesame than in brown sesame seeds while protein is equal to all of them, the fat is higher in brown sesame than in white sesame seeds. These can lead to recommendation the people to want nutrient feed with white sesame and more studies should be carried out to cover the proximate composition of Sudanese sesame oil under different environment and the exercise of all the result is added at the appendix.

Appendix (1)

Table (1): Approximate composition of white sesame:

moisture	Ash	Protein	Fat	fiber
5.31	4.81	19.08	47.41	5.09
5.22	4.96	18.81	46.67	5.88
5.18	4.67	18.96	47.18	5.85

Appendix (2)

Table (2): Approximate composition of brown sesame:

moisture	Ash	Protein	Fat	fiber
5.18	3.96	19.11	46.67	5.18
5.11	3.98	19.07	48.36	4.88
5.22	4.09	18.67	46.97	4.69

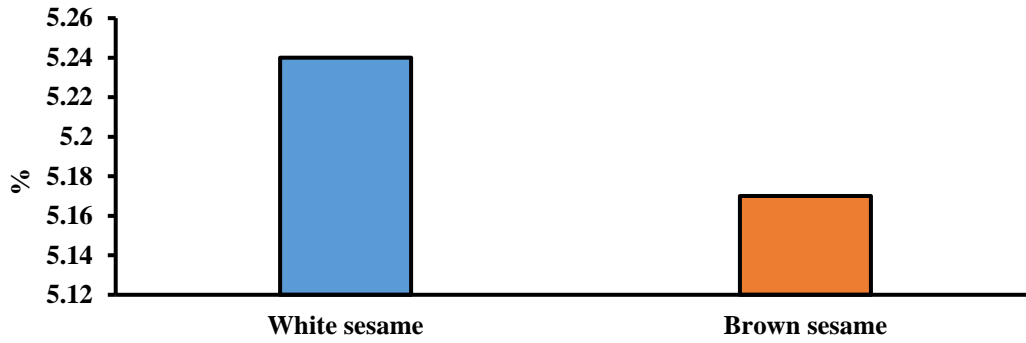


Fig. (1): Moisture content

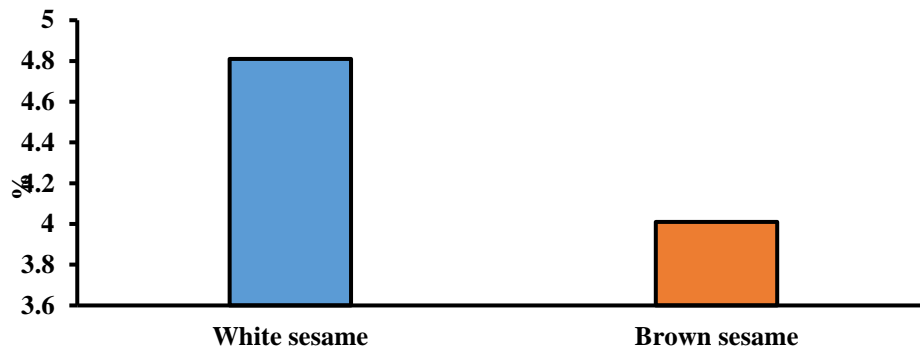


Fig. (2): Ash content

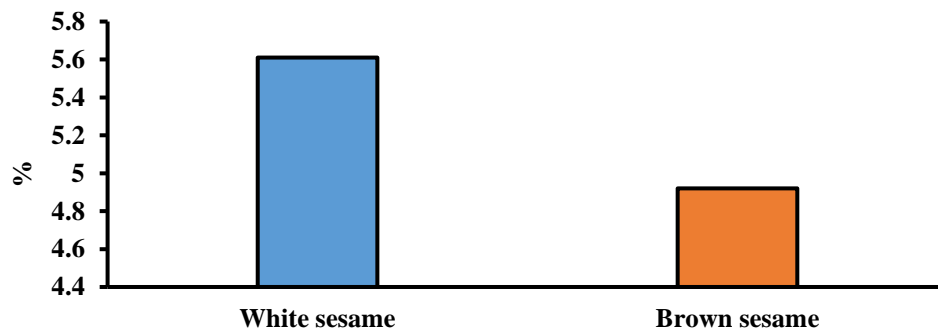


Fig. (3): Crude fibre

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