Study of the qualitative characteristics of pan bread enriched with *moringa oleifera* seed powder

Bushra Bader Jerad Al- Shammari*

Food Sciences Department, Agriculture College, University of Basrah, Basrah , Iraq.
***Corresponding author e-mail: bushra.jerad@uobasrah.edu.iq**
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Abstract

moringa plant seeds are an excellent source of important the scientific such as dietary fiber, protein, and antioxidants. The properties of different physiochemical compounds were investigated, as was the use of moringa seeds powder (MSP) in pan bread manufacture.at levels 2, 4, and 6% MSP were substituted for the wheat flour to make pan bread,the pan bread that was obtained was contrasted with the control sample, the moringa-fortified bread samples were assessed for their proximate, mineral, and sensory qualities. The proximate analysis's findings indicated that moringa seed powder has a protein 33.33±88192%, ash 2.83±44096% , fat 27.33±1.45297 % and fiber 5.25±25835%,while its moisture content 3±57735% and carbohydrate 71.75±88039% . Moringa seed powder also had aimportant increase in the amount of minerals (calcium1.3 mg/g, potassium 0.98 mg/g, and phosphorus 0.71 mg/g,). According to the findings of the sensory evaluation, pan bread made with wheat flour can be successfully fortification with 2% MSP. It is possible to use MSP as a source of protein and dietary fiber when making pan bread, which is beneficial for both food and machinery.

Keywords: moringa seeds, protein , pan bread, sensory evaluation , mineral·

Introduction

Utilizing foods that not only give food to the body but have historically been useful in the prevention and treatment diseases has received a lot of attention lately, which has led to the creation of meals heavy in vegetables and the current dietary trend of consuming functional foods. and anticancer chemicals may be crucial to protecting consumers' health, given the efforts made to reduce the incidence of diseases including cancer, cardiovascular disease, and coronary heart disease, as well as to enhance health status [1].

Among them is moringa. naturally occurring food supply that is utilized to improve the functionality of new foods, 15,000 - 25,000 round seeds with a brownish-colored, semi-permeable seed crust are formed annually from a only tree. The seeds typically have typical amounts of vitamins A and E, as well as polypeptides that act as coagulants [2]. Reviewing the use of Moringa seeds in pan bread would enable the

development of new product with enhanced functional and nutritional value, which is the goal of this study.

Materials and Methods

wheat flour extraction 72% ,sugar, salt, yeast, and seeds purchased at the local market in Basrah

Preparation of seed powder

A coffee mixer was used to grind the dried seeds. To create a fine powder, the powdered moringa seeds were sieved using a sieve with a mesh size of 50 and stored in plastic bags[1].

Proximate analysis

The commponents moisture, ash, fat , crude fibers, protein and carbohydrates were measured using the protocol outlined in [3]

Measurements of mineral

Minerals were measured using a spectrophotometer in accordance with [4]

Manufacture of moringa seed bread

wheat flour and moringa flour were sifted using a 500 µm mesh sieve, the dough was made using the direct dough method by carefully weighing and mixing the several components in clean basins, using a floured surface to prevent dough pallets, the dough was hand-kneaded for around 40 minutes until the gluten expanded and the dough became elastic, after 30 minutes of proofing, the dough was kneaded once more. the kneaded dough was transferred to the baking molds, which were greased before baking to prevent the dough from sticking together, the dough was allowed to ferment for 45 minutes at room temperature in baking pans covered with polyethylene bags, which caused gassing and the production of gluten, the leavened dough was put in the oven and cooked at 250 °C for thirty minutes, after baking, the bread was removed from the oven and set aside to cool on racks. the bread samples were kept dry and packed in plastic bags before being examined [5].

Physical tests of bread produced

As stated by [6], both the volume and the weight were calculated. the specific gravity (SG) of the bread was determined by distributing its volume (cm3) by its weight (g).

Sensory analysis of pan bread

The moringa bread was coded and then given to ten selected judges. The adjudicators were given instructions to rate the bread pan samples using a seven-point hedonic scale, 1–7 representing severe aversion and affinity, respectively. Such color, shape, mouth feel , texture, sweetness, flavor, and overall acceptability[7].

Analytical Statistics

Three replications of each analytical determination were carried out. we computed the means and standard deviations, the acquired data were examined using an analysis of variance (ANOVA). to compare the treatment means, Duncan's new multiple range tests (DNMRT) were employed. at $P<0.05$, statistical significance was deemed to exist.

Results and Discussion

The Chemical composition of Moringa powder

Table 1. shows the outcome of the approximate composition of the flour made from moringa seeds, the approximate composition of the moringa seed flour was found to be 3±577 % moisture, 71.75 ±880% carbohydrates, 5.25±258% fiber, 27.33±1.45% fat, 33.33±881% protein, and2.83± 440% ash respectively. These results did not agree with the results reached by [8] who found that the percentage of protein, carbohydrates, and fiber was lower, while the percentage of ash was high.

Table (1): The approximate composition, mineral in moringa seed powder

Properties	Moringa seed powder (%)
Moisture	577±3
Protein	881±33.33
Fat	1.45±27.33
Ash	440±2.83
Fiber	258± 5.25
Carbohydrate	880±71.75
Calcium	1.3mg/g
Phosphorus	0.71 mg/g
Potassium	0.98mg/g

In order to boost protein intake, defatted M. oleifera seeds may offer a cheap supply of protein as a food supplement to conventional diets. The characteristics of moringa oleifera differ according to crop management practices, climate fluctuations, and whether the plant is cultivated or remote the type of post-harvest processing used, the maturity level of the plant at harvest, and the growing region or land [7].

The approximate composition found in this study is consistent with the results of [1]for moringa seed powder. Is found that MSP had high levels of fat (28.69%), ash (4.97%), crude fibers (5.26%), and crude protein (31.90%). When it comes to the dietary fiber content shown in the same Table (1), MSP has the greatest proportion of dietary fibers, at 5.92%. These outcomes show a decline in litigation. [8] Is found that MSP had 36.7% fat, 7.3 fiber, 6.2% ash, and 7% moisture.

Additionally, it is evident from the results shown in the table above that MSP has significant levels of calcium and potassium. They noted 1.3 mg/g of calcium and, for

phosphorus and potassium, 0.71 and 1.98 mg/g respectively, certain physicochemical processes that are necessary for human life depend on minerals, less than 100 mg of microminerals (Fe, Cu, and Zn) and more than 100 mg of macrominerals (Na, Mg, K, Ca, P, and Cl) per day are needed [5]. It has been noted that the leaves and seeds of the moringa plant are rich in minerals that are vital to human growth and development, according to[8], moringa powder has more calcium than twice as much as milk and more iron as spinac.

Physical characteristics of pan bread

with The results displayed in Table 2. demonstrated that the of bread volume and specific volume increased progressively as the level of replacement increased when wheat flour (72% ext.) was partially substituted with 6% MSP, The gluten network may have lost some of its strength, but the dough's air content may have been preserved by the 2 and 4 % MSP[10]. according to[2], increased fiber content, which is characterized by a higher water-holding ability, may be the cause of the rising volume of cookies

Table (2): Physical characteristics of pan bread with moringa seeds added in a lab .

Levels	Weight	Volume	Specific volume
0%	149.6±0.333a	210±5.77a	1.40±0.040a
2%	146.33±3.17a	203±3.33a	1.38±0.027a
4%	146.66±3.33a	210±5.77a	1.42±0.017a
6%	143±3.17a	250±5.77b	1.73±057b

Conversely, when the quantity of substitution increased in relation to the control sample, the weight of the bread pan rapidly decreased, the decreased gluten content combined with an increase in non-gluten flour that was unable to be adequately stretched by carbon dioxide (CO_2) gas during fermentation and proofing may be the cause of the decrease in weight, height, volume, and specific volume, gluten is a crucial protein that helps to create a tougher dough matrix and traps air cells to increase the volume of bread[5].[11] suggested that the high fiber content of the moringa seed could be the cause of the decline.

Sensory evaluation

Table 3. and Fig 1. Showed the average sensory ratings of the pan bread supplemented with moringa seeds powder, nearly all of the sensory qualities of the unfortified bread's scores differ from the mean sensory scores of the wheat bread fortified at 4 and 6% MSP in a meaningful way ($P > 0.05$). sample pan bread with 2%MSP, had a higher values for color , shape, texture and over all acceptability than sample bread 0, 4 and 6%MSP, which had the maximum score of 6.19±244, 6.69±117, 6.69±.123 and5.88±.119 , the value of sample , which was bread 4 and 6%MSP the lowest,

thereafter decreased, the hue was chosen depending on how appealing it was, the panelists indicated that samples 4 and 6% had a preference for the brown color. The bread samples' browning may have resulted from caramelization brought on by extreme heating during processing or from Maillard-type reactions brought on by the presence of reducing sugars, proteins, and amino acids [7].

Table (3): Sensory characteristics of pan bread with moringa seeds added in a parameters

Characteristics	0%	2%	4%	6%
Color	5.41±0.435a	6.19±244a	4.52±0.296ab	3.49±0.278c
Shape	5.91±0.308a	6.69±117b	5.70±0.125a	4.58±0.133c
Sweetness	5.03±0.333a	4.60±0.373a	3.61±0.370b	2.96±0.262b
Texture	6.12±0.128a	6.69±0.123b	6.13±0.183a	5.36±0.186c
Flavor	6.57±0.106a	6.24±088a	5.66±0.146b	5.14±188c
Mouthfeel	6.65±0.106a	6.18±0.162a	5.71±0.284ab	4.52±0.399b
Over all acceptability	5.80±0.137a	5.88±0.119a	5.07±0.163ab	4.25±145c

There was a large variation in the bread sample's texture scores, which ranged from 6.69±.123 at 2% to 5.36±.186 at 6%, the oil content most likely softened the crumb that was linked to a higher fiber content, the state of the bread ingredients, such as fiber, starch, and protein, the amount of water absorbed during dough mixing; and the baking conditions (temperature and time variables) will all affect the overall acceptability of the results. Additionally, there were notable distinctions between the bread samples and the control sample, where sweetness and mouthfeel was replaced with 4 and 6% MSP. This discovery suggests that powdered moringa seed could be used as a dietary supplement. [5]found that bread supplemented with moringa seed flour yielded comparable outcomes. powdered moringa seeds, all samples received overwhelming approval from customers, with a pass average score greater than 5. conversely, the bread with 2.5 percent powdered moringa seeds possessed the best sensory qualities.

In developing countries like these, where many high-fiber meals are too expensive, adding moringa seed powder to wheat bread fortification significantly increased the bread's fiber content, according to this study. Additionally, because moringa seed has a high mineral content, bread supplemented with moringa may help reduce hidden hunger. Research has demonstrated the high protein and dietary fiber content of moringa seeds, suggesting that baked goods may be made from these seeds.

References

1) Rabie, M. M., Ibrahim, F. Y., Youssif, M. R. G., & Ezz El-Ragal, N. M. (2020). Effect of Moringa oleifera leaves and seeds powder supplementation on quality characteristics of cookies. *Journal of Food and Dairy Sciences*, *11*(2), 65-73.

2) Sahay, S., Yadav, U., & Srinivasamurthy, S. (2017). Potential of Moringa oleifera as a functional food ingredient: A review. *Magnesium (g/kg)*, *8*(9.06), 4-90.

3) AOAC. (2010). Official Methods of Analysis. 18th Edition, Association of Official Analytical Chemists, Arlington.

4) AOAC (2005) Official methods of analysis of the Association of Official Agricultural Chemists, 15th edn. AOAC, Washington

5) Eke, M. O., ELECHI, J. O. G., & Bello, F. (2022). Effect of fortification of defatted Moringa oleifera seed flour on consumers acceptability and nutritional characteristics of wheat bread. *European Food Science and Engineering*, *3*(1), 18-25.

6) AACC. (2002). Official Methods of Analysis. 18th Edition, Association of Official Analytical Chemists, Arlington

7) Bolarinwa, I. F., Aruna, T. E., & Raji, A. O. (2019). Nutritive value and acceptability of bread fortified with moringa seed powder. *Journal of the Saudi Society of Agricultural Sciences*, *18*(2), 195-200.

8) Leone, A., Spada, A., Battezzati, A., Schiraldi, A., Aristil, J., & Bertoli, S. (2016). Moringa oleifera seeds and oil: Characteristics and uses for human health. *International journal of molecular sciences*, *17*(12), 2141.

9) Milla, P. G., Peñalver, R., & Nieto, G. (2021). Health benefits of uses and applications of Moringa oleifera in bakery products. *Plants*, *10*(2), 318

10) Abu El-Maaty, A. S., El-Nemr, S. E., El-Shourbagy, G. A., & Galal, G. A. (2016). Effect of addition oyster mushroom and red beet root by-products on quality of pan bread. *Zagazig Journal of Agricultural Research*, *43*(2), 507-517.

11) Elleuch, M., Bedigian, D., Roiseux, O., Besbes, S., Blecker, C., & Attia, H. (2011). Dietary fibre and fibre-rich by-products of food processing: Characterisation, technological functionality and commercial applications: A review. *Food chemistry*,