



The influence of adding date pit powder on the rheological characteristics of wheat flour and bread quality

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Abstract

Date pits (DP) have been researched as a potential alternative source of fibre for food products, so the experiment was conducted to ascertain the rheological properties and physical characteristics of pan bread, after undergoing rheological analysis, blends of ground date pits and wheat flour² and 4% DPP were utilized to make bread. The results indicated that adding date pit powder had a detrimental impact on stability, development time and water absorption, the date seed powder's moisture, protein, carbohydrate, fat, ash and fibre contents were determined to be 7.66 ± 0.88192 , 6.33 ± 0.33333 , 51.68 ± 0.57735 , 8 ± 0.57735 and $2 \pm 0.57735\%$ respectively, DP was used in place of the wheat flour at 2 and 4% contraction, and the approximate composition of date seeds was ascertained, due to its high nutritious content, date seed powder can be utilized to create creative goods. Therefore, it is crucial for the date industry in the nations that produce dates to make use of this inexpensive agricultural by-product.

Keywords: Date pit, Fiber, Rheological properties, Bread, Wheat flour

Introduction

One of the oldest fruit trees that has been associated with Middle Eastern cultures, particularly the Kingdom of Saudi Arabia, since ancient times is the palm of dates. The majority of people are familiar with and eat the fruit flesh of the palm of dates, but they discard the highly nutritious seed (Wahini, 2016). According to (Guizani et al., 2014), the globe produced 7.5 million tons of dates in 2011, which translates to about 750 thousand tons of date pits produced in that year. Every year, a significant amount of date pits are derived from waste nutrients from date manufacturing, high

concentrations of beneficial bioactive chemicals and dietary minerals are found in date seeds' fibre, which qualifies them for use in the cooking of foods high in fiber (Golshan Tafti et al., 2017), according to recent research, date seeds have higher levels of antioxidants, flavonoids, and phenolic compounds than those found in the flesh. They also have higher dietary fibre content. α -Tocopherol, ascorbic acid, glutathione, and polyphenolic compounds like sinapic acid and caffeic acid are present in high concentrations, along with protocatechic acid, additionally, dates seeds are classified as multi-aromatic, containing alcohols, citrates, aldehydes, ketones, and saturated and unsaturated hydrocarbonates, Additionally, dates seeds are classified as multi-aromatic, containing alcohols, citrates, aldehydes, ketones, and saturated and unsaturated hydrocarbonates, Date seeds have a somewhat bitter flavor combination and are odorless. (Sriharsha et al., 2021). additionally, dates seeds are classified as multi-aromatic, containing alcohols, citrates, aldehydes, ketones, and saturated and unsaturated hydrocarbonates (Saafi-Ben Salah et al., 2012).

Material and methods

Making date seed powder: A laboratory mill was used to grind the date pit into a powder with a 0.01 mm particle size. Before being used, the ground date pit powder was stored in tight jars and kept cold (Salem & Habiba, 2013). The following parameters were tested using a conventional procedure: moisture, fat, protein, ash, fiber, and carbs (Sriharsha et al., 2021)

Farinograph readings

Using Farinograph, 300 g of wheat flour and wheat flour containing 2 and 4% date pit were examined independently in accordance with established (Committee, 2000) procedures.

Preparing Pan bread

Wheat flour and date pits flour 2 and 4% were used in the bread formulation dough. oil, One gram of yeast and one gram of salt are individually combined to create a homogenized mixture per 100 grams of flour blend. blends were diluted in accordance with the farinograph's water absorption, to create dough, the mixes were manually combined for fifteen minutes, to finish fermentation, the dough was maintained at 25, 85% RH, for 25 minutes. the bread was then baked for one to two minutes at 450C in a mechanical gas oven, after letting the bread cool, it was sealed in polyethylene bags (Ahfaiteer et al., 2018)

Decisiveness physical attributes of bread

The physical attributes were determined by (Committee, 2000) method.

Sensory estimation of pan bread

The sensory estimation test was performed to evaluate the bread's sensory acceptability, six adult members of a trained panel evaluated the bread using four-digit random codes. A five-point rating system was used to assess the color, texture, Aroma and general acceptability of the bread, such Dislike (2), like (4), dislike (3), dislike (5), and dislike (1) a great deal (Ahfaiter et al., 2018). One-way analyses of variance, or ANOVA, were used to statistically examine the data on the physical and sensory qualities (Salem & Habiba, 2013).

Results and discussion

Chemical examination of powdered red date pits

Table 1 displays the approximate analysis of the prepared date pits powder. according to data, date pits included the following amounts of protein, fat, fiber, ash, and total carbohydrates were 7.66 ± 0.88192 , 8 ± 0.57735 , 24.33 ± 1.85592 , 2 ± 0.57735 and $51.68 \pm 0.57735\%$ respectively, date pits could be used as a source of fiber, fat and protein.

Table 1. Chemical examination of powdered date pits

Chemical content	date pit powder%
Moisture	7.66 ± 0.88192
Protein	6.33 ± 0.33333
Fat	8 ± 0.57735
Ash	2 ± 0.57735
Fiber	24.33 ± 1.85592
Carbohydrate	51.68 ± 0.57735

These findings concur with (Reddy et al., 2017), who found that the date pits had high fiber and protein 57.24% and 10.7%.

Rheological properties

Table 2 displays the data the impact of the addition DPP on the rheological properties, the increasing level of DPP addition in the wheat flour resulted in a decrease in water absorption value, development time and stability.

Table 2. Impact of date pits powder addition on bread 's farinograph characteristics.

Contractions	Wa%	DTmin	ST min	DS fu	FQN
0%	56.6	2	7.8	85	26
2%	56	1.9	7.1	127	26
4%	52.2	1.5	1.9	82	22

Wa: water absorption, DT: development time, S: stability time, DS: degree of softening, FQN: farinograph quality number

stability, water absorption value and development time were reduced from 7.8min, 56.6% and 2 for the control to 7.1 min , 56% and 1.9 min , additionally, for wheat flour replaced with 2and4 % of DPP respectively, This decrease in stability time signifies a weakening of the dough strength, which is reflected in the blends' diluting effect—a decrease in wheat gluten content. These findings were in good contract with (Ajila et al., 2008; Ibrahim et al., 2018) findings and.

Decisiveness physical attributes of bread

Effects of substituting WF on the physical attributes of bread are displayed in Table 3. When the fortified bread with additions of date pits powder 2 and 4%, DPP was substituted, the specific volume gradually dropped from 1.86 ± 13013 for control to 1.76 at 2% DPP substitution, while the weight and volume were steadily decreased by raising the replacement level until it reached 170 ± 5.77350 g and 303 ± 3.33333 cm³ lower than control.

Table 3. Pan bread's physical attributes with different date pits

Sample	Weigh g	Volume cm ³	specific volume cm ³ /g
0%	$195 \pm 2.30940a$	$363 \pm 21.85813a$	$1.86 \pm 13013a$
2%	$170 \pm 5.77350b$	$303 \pm 3.33333a$	$1.76 \pm .06360a$
4%	$181.66 \pm 7.26483a$	$326 \pm 21.85813a$	$1.80 \pm .18977a$

These outcomes matched those of (Bouaziz et al., 2010) who demonstrated that adding fiber to bread formulation lowers volume.

Sensory calculation

The sensory calculation scores of the date pits powder-fortified bread are shown in Table 4. color, texture, odor, taste and overall acceptability of the control received mean scores of 4.0533 ± 24655 , 3.9017 ± 30682 , $4.4017 \pm .19443$, $4.6733 \pm .23891$ and $4.5350 \pm .20712$, However, fortifying bread with 4% date pits led to a substantial ($P < 0.05$) drop in all sensory evaluation criteria when

compared to the control, date pits have a bland, somewhat bitter flavor and no scent. It has a light and black brown color throughout (Elgindy, 2020).

Table 4. Sensory analysis of bread made with different amounts of powdered date pits (Ahfaiter et al., 2018).

	Color	Aroma	Texture	Taste	Overall acceptability
0%	4.0533±24655a	4.4017±.19443a	3.9017±30682a	4.6733±.23891a	4.5350±.20712a
2%	3.388±.19627b	3.3483±.33971b	3.2017±.31507a	3.9150±29590b	4.1650±30750a
4%	2.4800±.19162c	2.6667±.42164b	2.4800±.41238b	3.4000±.20000b	3.0000±.36515b

The replacement bread 2% had excellent sensory evaluations and did not vary statistically from the control, conversely, the other bread alternative 4% had poor sensory ratings, as a result 2% of the flour in various bakery goods such as bread, may include date pit powder, there aren't many studies looking into adding powdered palm date pits to bread, the quality of the bread was improved and the staling scene was retreated by adding heated, defatted Agwa and Aprimi pits at contractions of 1 and 3% (Alibouazizi *et al.*, 2010).

Conclusion

The study's findings indicate that date pits powder is an excellent source of fiber, it is possible to generate bread with fiber and sensory qualities by adding DPP to wheat flour, according to the findings. The most acceptable bread, according to the sensory examination was 2%DPP bread, date pits powder can be utilized to make a range of goods, date pits have the potential to be employed as ingredients in baked products by improving the nutritional content of various food items.

References

- Ahfaiter, H., Zeitoun, A., & Abdallah, A. E. (2018). Physicochemical properties and nutritional value of Egyptian date seeds and its applications in some bakery products. *Journal of the Advances in Agricultural Researches*, 23(2), 260–279.
- Ajila, C. M., Leelavathi, K., & Rao, U. J. S. P. (2008). Improvement of dietary fiber content and antioxidant properties in soft dough biscuits with the incorporation of mango peel powder. *Journal of Cereal Science*, 48(2), 319–326.
- Bouaziz, M. A., AMARA, W. B. E. N., Attia, H., Blecker, C., & Besbes, S. (2010). Effect of the addition of defatted date seeds on wheat dough performance and bread quality. *Journal of Texture Studies*, 41(4), 511–531.
- Committee, A. A. of C. C. A. M. (2000). Approved methods of the American association of cereal chemists.

- Elgindy, A. A. E. (2020). CHEMICAL AND TECHNOLOGICAL STUDIES ON KHALAS DATE SEEDS POWDER. *Zagazig Journal of Agricultural Research*, 47(6), 1479–148888.
- Golshan Tafti, A., Solaimani Dahdivan, N., & Yasini Ardakani, S. A. (2017). Physicochemical properties and applications of date seed and its oil. *International Food Research Journal*, 24(4).
- Guizani, N., Suresh, S., & Rahman, M. S. (2014). Polyphenol contents and thermal characteristics of freeze-dried date-pits powder. *International Conference of Agricultural Engineering, Zurich*.
- Ibrahim, F. Y., Aboulmaga, E. A., Youssif, M. R. G., & El-Gaafary, M. A. (2018). Effect of Substitution with Mango Peels and Seed Kernels as By-Products on the Quality of Pan Bread and Cake. *Journal of Food and Dairy Sciences*, 9(12), 439–445.
- Reddy, M. K., Rani, H. D., Deepika, C. N., Samrawat, S., Akshara, V., & Rajesh, K. (2017). Study on physicochemical properties of oil and powder of date palm seeds (*Phoenix dactylifera*). *Int J Curr Microbiol App Sci*, 6(12), 486–492.
- Saafi-Ben Salah, E. B., Flamini, G., El Arem, A., Issaoui, M., Dabbou, S., BenYahia, L., Ferchichi, A., Hammami, M., & Achour, L. (2012). Compositional characteristics and aromatic profile of date palm seeds from seven varieties grown in Tunisia. *International Journal of Food Science & Technology*, 47(9), 1903–1908.
- Salem, I., & Habiba, R. (2013). Chemical and Rheological Characteristics of Butter Cake as Affected by Date Seed Powder Addition. *Suez Canal University Journal of Food Sciences*, 1(1), 13–18.
- Sriharsha, C. H., Swamy, R., & Padmavathi, T. V. N. (2021). Preparation and quality evaluation of date seed powder.
- Wahini, M. (2016). Exploration of making date seed's flour and its nutritional contents analysis. *IOP Conference Series: Materials Science and Engineering*, 128(1), 12031.