

Development and quality evaluation of date seed powder incorporated cookies

ABSTRACT

Aims: To incorporate date seed powder in the preparation of cookies and to perform the quality evaluation of the cookies.

Study design: Experimental design

Place and Duration of Study: College of Food Science and Technology, PJTS Agricultural University, Rudrur, from March 2021 to August 2021.

Methodology: The cookies was prepared by formulating trials. For test samples the refined wheat flour was replaced with date seed powder in different proportions. Sensory evaluation was performed to know the acceptability of the cookies. Quality evaluation was performed for the control sample and the most accepted cookies.

Results: Results of sensory evaluation showed that 12% date seed powder incorporated cookies was highly acceptable with a score of overall acceptability 8.3. Carbohydrates, protein, fat, fiber content of the standardized cookies was found to be 60.57%, 5.78%, 22%, 5.26% respectively. The physical parameters like diameter, thickness and spread ratio increased with supplementation of date seed powder.

Conclusion: Date seed powder rather discarding as waste; can be used to develop innovative products. Date seed powder can be used to develop products with functional and nutraceutical use.

Keywords: Date seeds, fiber, cookies, quality evaluation

1. INTRODUCTION

Date palm plays an important role in the economic and social life of the people in the date producing countries [1]. The date is an important agricultural crop in most of the Middle East countries and date is a staple food for millions of people in the world. It is an important plant in arid region. *Pdactylifera* (date palm) is a flowering plant species belongs to the palm family of *Arecaceae* [2].

The fruit of the date palm is composed of a fleshy pericarp and seed that is usually oblong, ventrally grooved, with a small embryo and a hard endosperm. Date seeds constitute 10-15% of the weight of date fruit. The seed characteristics of date varieties change according to variety and environmental conditions. Soil fertilization [3], irrigation, daily temperatures, duration of the growing period and other post-harvest treatments (further drying or

moistening of the fruit) are the factors which can affect on physical properties of the date fruits. It is conceivable that these factors are also likely to affect those of the date seeds [4].

The length, width and weight of the seeds range from 1.2-3.6 cm, 0.6-1.3 cm and 0.5-4 g, respectively. Date seeds contain high levels of valuable bioactive compounds and dietary fiber [5].

The seeds are mainly utilized as animal feeds by cattle, sheep, camel, and poultry industries. Roasted and powdered date seeds are used by some rural communities as coffee substitutes and coffee like preparations made from date seeds [6]. Date seeds do not have a smell or odorless and has a slightly bitter taste blend. In general, it has a light and dark brown [7]. Date seeds are reported to contain many minerals such as sodium, potassium, magnesium, calcium, phosphorus, iron manganese, zinc, copper, nickel, cobalt, chromium, lead and cadmium [8]. Dates provide a good source of energy (213 and 314 kcal/100 g—fresh and dried respectively) mostly due to the high carbohydrate content, averaging 54.9 and 80.6 g/100 g for fresh and dried fruit, respectively. Date seeds were found to be excellent source of dietary fiber and their variety level was between 64.5 and 80.15 g/100 g fresh weight [9].

Cookies have now become loved fast food products for every age group. These are easy to carry, tasty to eat, cholesterol free and reasonable at cost. In India about 25% of the wheat is used in the preparation of baked goods (Kamaljit et al10) [10] States that have large intake of biscuits and cookies are Maharashtra, West Bengal, Andhra Pradesh, Karnataka, and Uttar Pradesh. Cookies are one of the best known quick snack products. They are characterized by a formula high in sugar and shortening and low in water. The main ingredients of cookies are wheat, flour, fat, and sugar. Water is also added, helping the process of making cookies but is not a final ingredient, that is it is not a component of final food product. The chemical composition of cookies is of significance importance as they contain 22-30% of fat, 4-8% protein contents and 60-70% carbohydrates. Cookies require soft dough, while biscuits require hard dough. Cookies are little heavier than biscuits, whereas, biscuits are fluffier than cookies. Cookies contain more sugar than biscuits.

2. MATERIAL AND METHODS

2.1 Experimental materials

The raw materials used were dates, refined wheat flour, shortening, sugar, baking powder and vanilla essence were procured from the local market at Rudrur, Nizamabad. Chemicals such as Mercuric oxide, Potassium sulphate, Sodium hydroxide, Boric acid, Hydrochloric acid, Petroleum ether and Sulphuric acid were purchased from M/s Telangana scientific Pvt Ltd, Hyderabad, Telangana state.

2.2 Preparation of date seed powder

Dates were purchased from the local market. The seeds from the dates were separated manually and dried; then grinded into powder

2.3 Preparation of date seed powder incorporated cookies

The cookies were prepared using the following method shown in Fig.1 with standard control recipe and formulated trials (Table 1) For test samples, the refined wheat flour in the formulation was replaced with date seed powder @ 6, 12 and 18 percent (w/w) as shown in Table 1 [11]

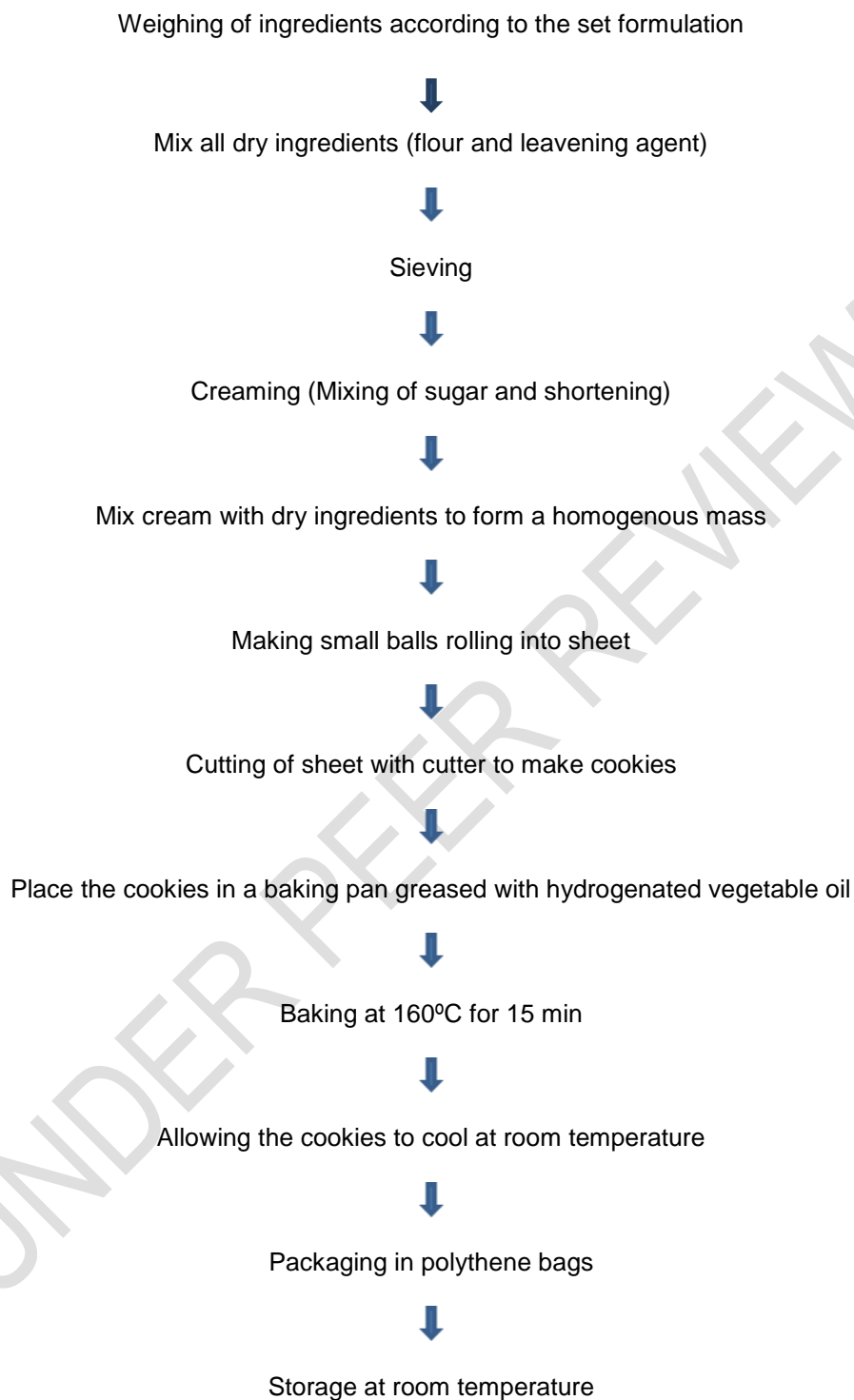


Fig.1 Flow diagram for preparation of cookies

The quantity of ingredients for the formulation of cookies was given as follows:

Table 1: Formulation of date seed powder incorporated cookies

Ingredients(g)	Control	F1	F2	F3
Refined wheat flour	50	47	44	41
Date seed powder	-	3	6	9
Shortening	30	30	30	30
Sugar	25	25	25	25
Leavening agent (baking powder)	0.5	0.5	0.5	0.5
Water	2.5	2.5	2.5	2.5
Flavour (vanilla essence)	0.25	0.25	0.25	0.25

F1- control sample

F2-with 6% date seed powder

F3-with 12% date seed powder

F4-with 18% date seed powder

2.4 Physical analysis of cookies

The determination of diameter, thickness was done by following the method of AACC (2000) [12]. Spread ratio was determined from the diameter and thickness using the formula:

Spread ratio: D/T Where, D is the diameter and T is the thickness of cookies.

2.5 Chemical analysis of cookies

2.5.1 Estimation of moisture content

Moisture content of the developed products was measured by using standard method (AOAC 2016) [13].

2.5.2 Estimation of Protein content

Protein estimation was done by micro-kjeldahl method. (AOAC 2000) [14].

2.5.3 Estimation of Fat content

Fat content was estimated by Soxhlet method AOAC (2000) [12] using the automatic SOCS Plus Solvent Extraction System.

2.5.4 Estimation of Ash content

The total ash content of given food sample was estimated by using AOAC (2016) [13] method.

2.5.5 Estimation of Crude fiber

Crude fiber content was determined by standard method (AOAC 2016) [13].

2.5.6 Estimation of carbohydrate content

Carbohydrate is done by difference method. Carbohydrates can also define chemically as neutral compounds of carbon, hydrogen and oxygen.

$$\text{Carbohydrate (\%)} = 100 - (\% \text{ Moisture} + \% \text{ Ash} + \% \text{ Fat} + \% \text{ Protein})$$

$$\text{Net carbohydrates} = \text{Actual carbohydrates} - \text{fiber}$$

2.6 Sensory analysis

The sensory evaluation of prepared samples was carried out a 10 member trained panel comprised of under graduate students and academic staff members of the faculty who had some previous experience in sensory evaluation. The panel members were requested in measuring the terms identifying sensory characteristics and in use of the score. Judgment were made through rating products on a 9 points Hedonic Scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'. The format for sensory evaluation card [15].

3. RESULTS AND DISCUSSION

Preparation of products

The procedure for preparation of cookies is followed as shown in flow sheet. The resulted products from four formulations of one control sample and 3 formulations of date seed powder incorporated cookies varied in physical, chemical and organoleptic properties. The prepared cookies are shown in **Fig- 2, 3, 4 & 5**.



Fig.2 F1 Cookies



Fig.3 F2 Cookies



Fig.4 F3 Cookies



Fig.5 F4 Cookies

3.1 Physical analysis of cookies

Date seed cookies were evaluated for the physical parameters like diameter, thickness, spread ratio and spread factor. The results were presented in table-2.

Physical characteristics of the cookies were presented in table. It was found that the diameter of the cookies increased with the increased level of date seed powder. There was an increase in the thickness with by increasing supplementation. With the increase in date seed powder the spread ratio also increased gradually. Spread factor also increased with the increase in date seed powder.

Similarly physical analysis of cookies was carried out by Raihan et al., 2017 [16]. Diameter, thickness and spread ratio was determined for cookies.

Table:2 Physical analysis of cookies

S.no	Parameter	F1(control)	F2	F3	F4
1	Diameter(mm)	41.98±0.04	45.9±0.02	47.17±0.3	48.18±0.04
2	Thickness(mm)	8.10±0.01	8.4±0.03	8.52±0.02	8.56±0.04
3	Spread ratio	5.18±0.01	5.46±0.03	5.53±0.02	5.62±0.01
4	Spread factor	51.8±0.01	54.6±0.03	55.3±0.02	56.2±0.01

Values are means ± SD of three independent determinations

3.2 Organoleptic evaluation of cookies

Sensory evaluation acceptance tests were performed for cookies; which were formulated by the addition of date seed powder in different proportions to know the acceptability of the prepared products by using Hedonic scale. Judgement were made through rating products on a 9 points Hedonic scale with corresponding descriptive terms ranging from 9 'like

extremely' to 1 'dislike extremely'. The acceptance scores assigning for various sensory parameters like appearance, colour, flavour, texture, taste and overall acceptability.

It was observed that the highest overall acceptability score was awarded for sample F3 8.3 because it got acceptable results in flavour, colour, texture whereas the lowest value received for sample F4. The next parameter i.e., colour serves as the important parameter for the acceptance of food samples. The highest score found in sample F3 8.1 because of its acceptable colour whereas the lowest score was observed for the sample F1 7.2. The texture profile F2, F3 received the equal sensory score which was notes as 8.4. The highest value of flavour obtained for F3 and lowest for the sample F4 6.5. M. Nasir *et al.*, (2010) done sensory evaluation for cookies prepared with defatted maize germ by using 9-point hedonic scale in order to check the acceptability of cookies. All the sensory scores including overall acceptability revealed that the cookies with acceptable quality could be prepared with added defatted maize germ [17].

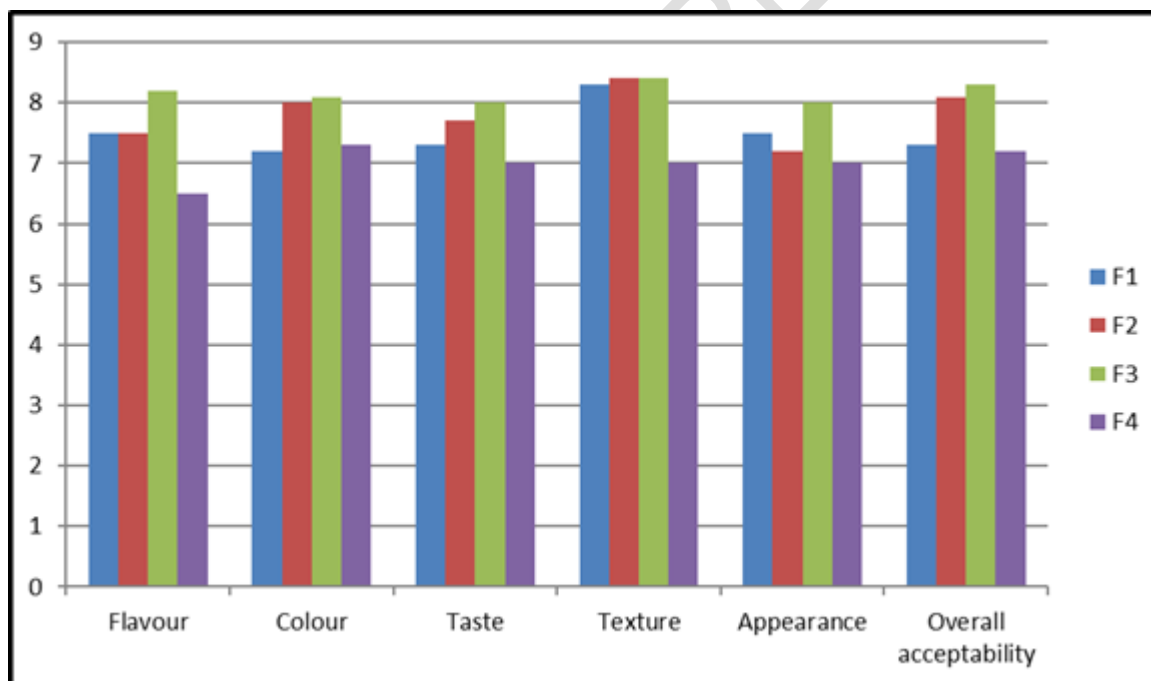


Fig.6 Organoleptic evaluation of cookies

3.3 Proximate composition of control sample and optimized cookies

The cookies were optimized with help of sensory analysis. Proximate composition of control cookie sample and optimized sample i.e., date seed powder cookies (12% date seed powder)

It was observed that the moisture content of control sample is less 3.2% compared to date seed cookies 4.9%.the protein content significantly increased from 2.91% to 5.78%. It was

observed that fibre content in the optimized cookies was 5.26% which is more as compared to control sample. Similarly increase in the proximate composition was observed for date seed powder incorporated biscuits by Vinita et al., (2016) [18]. The powder of seeds from four varieties of date fruit were incorporated in biscuits @ 5, 10 and 15% levels. The study revealed that the date seed powder can be acceptable upto 5% and the nutrient composition of supplemented biscuits had higher content of fibre.

Similarly, proximate analysis of the cookies prepared from wheat/cooking banana flour blend was carried out by China M. A. H *et al.*, (2020) [19]. The moisture, protein, carbohydrate, fat, crude fibre and ash content of the cookies were determined using the methods described by AOAC (2012).

Table 3: Proximate composition of control sample and optimized cookies.

S.No	Parameter	Control	Date seed cookies (F3)
1	Moisture (%)	3.2 ± 0.16	4.9 ± 0.25
2	Ash (%)	0.54 ± 0.11	1.49 ± 0.07
3	Protein (%)	2.91 ± 0.23	5.78 ± 0.27
4	Fat (%)	23 ± 0.28	22 ± 0.37
5	Carbohydrates (%)	69.54 ± 0.49	60.57 ± 0.34
6	Fiber (%)	0.85 ± 0.14	5.26 ± 0.25

4. CONCLUSION

From the study it can be concluded that date seed powder is the potent source of all the major nutrients. Due to its high nutrient content it can be used in preparation of variety of products. It can be used in the preparation of bakery, confectionery and snack products. The products made with date seed powder was found acceptable in terms of taste, colour and flavour. Date seed powder can be used to develop special products for functional and nutraceutical use.

COMPETING INTERESTS DISCLAIMER:

AUTHORS HAVE DECLARED THAT NO COMPETING INTERESTS EXIST. THE PRODUCTS USED FOR THIS RESEARCH ARE COMMONLY AND PREDOMINANTLY USE PRODUCTS IN OUR AREA OF RESEARCH AND COUNTRY. THERE IS ABSOLUTELY NO CONFLICT OF INTEREST BETWEEN THE AUTHORS AND PRODUCERS OF THE PRODUCTS BECAUSE WE DO NOT INTEND TO USE THESE PRODUCTS AS AN AVENUE FOR ANY LITIGATION BUT FOR THE ADVANCEMENT OF KNOWLEDGE. ALSO, THE RESEARCH WAS

NOT FUNDED BY THE PRODUCING COMPANY RATHER IT WAS FUNDED BY PERSONAL EFFORTS OF THE AUTHORS.

REFERENCES

1. Basuni, A. M. M. and AL-Marzooq, M.A. 2010. Production of mayonnaise from date pit oil. Food and Nutrition Sciences 2: 3-8.
2. Chitra Devi Venkatachalam, MothilSengottian (2016). Study on Roasted Date Seed Non Caffeinated Coffee Powder as a Promising Alternative. Asian Journal of Research in Social Sciences and Humanities, 6(6):1387-1394
3. Basha, M. A. and Abo-Hassan, A. A. 1982. Effects of soil fertilization on yield, fruit quality and mineral content of Khudari date palm variety. Paper presented at the Proceedings of the First International Symposium on Date Palm, King Faisal University, Saudi Arabia.
4. Hosam M Habib, Wissam H Ibrahim (2009). Nutritional quality evaluation of eighteen date pit varieties. International journal of food sciences and nutrition 60 (sup1), 99-111, 2009
5. Al-Farsi, M. A. and Lee, C. Y. 2011. Usage of date (*Phoenix dactylifera* L.) seeds in human health and animal feed. In Preedy, V. R., Watson, R. R. and Patel, V. B. (Eds). Nuts and seeds in health and disease prevention, p. 447-452. USA.
6. Sami Ghnimi, RaisaAlmansoori, BaboucarrJobe, Hassan MH and Kamal-Eldin A, Quality Evaluation of Coffee-Like Beverage from Date Seeds (*Phoenix dactylifera*, L.), J Food Process Technol,2015; 6(12): 1-6.
7. M Wahini (2016). Exploration of making date seed's flour and its nutritional contents analysis. IOP CONF. Series: Materials Science and Engineering doi: 10.1088/1757-899X/128/1/012031.
8. Golshan Tafti, A., SolaimaniDahdivan, N. And YasiniArdakani, S.A (2017). Physicochemical properties and applications of date seed and its oil. International Food Research Journal 24(4): 1399-1406.
9. Al-Farsi MA, Lee CY (2008a) Nutritional and functional properties of dates: a review. Crit Rev Food Sci Nutr 48:877–887
10. Kamaljit K, BaljeetS, Amarjeet K (2010). Preparation of bakery products by incorporating pea flour as a functional ingredient. American Journal of Food Technology. 5(2):1309- 135.
11. Soni, N., Kulkarni, S. A and Patel, L. (2018). Studies on development of high protein cookies. International Journal of Chemical Studies. 6(6): 439-444
12. AACC. Approved Methods of the American Association of Cereal Chemistry. 10th ed. St. Paul: American Association of Cereal Chemists. 2000.
13. AOAC. Official Methods of Analysis 15th Edition Association of Official Analytical Chemists, Washington DC 2016

14. AOAC. Official methods of the Association of official Analytical Chemists, Washington, D.C., 11th Edn 2000.
15. Amerine, M.A., Pangborn, R.M. and Roesslev, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press Inc, New York.
16. Raihan, M. and Saini, C.S. (2017). Evaluation of various properties of composite flour from oats, sorghum, amaranth and wheat flour and production of cookies thereof. International Food Research Journal 24(6): 2278-2284
17. M. Nasir, M. Siddiq, R. Ravi, J. B. Harte, K. D. Dolan, and M. S. Butt (2010). Physical quality characteristics and sensory evaluation of cookies made with added defatted maize germ flour. Journal of Food Quality 33 (2010) 72-84
18. Vinita, Darshan Punia (2016). Sensory characteristics and nutrient composition of biscuits prepared by using seed powder of date fruits. International Journal of Food Science and Nutrition vol.1, issue 2 ISSN: 2455-4898.
19. China, M. A. H., Tew, B.C., Olumati, P. N. (2020). Proximate and sensory properties of cookies developed from wheat and cooking banana (MUSA ACUMINATA) flour blends for household utilization. European Journal of Food Science and Technology Vol.8, No.2, pp.1 ISSN: 2056-5798.