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Sensory characteristics and nutrient composition of biscuits prepared by using seed powder of date fruit (*Phoenix Dactylifera*)

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Abstract
The present investigation was conducted to evaluate the suitability of date seed powder for preparation of biscuits and to study their sensory characteristics and nutrient composition. The powder of seeds obtained from four varieties of date fruit, namely Hillawi, Khadrawi, Medjool and Shamran were incorporated in biscuits at 5, 10 and15% levels. The findings of the study showed that the mean scores of organoleptic acceptability of control and Type-1 (5% seed powder supplementation) biscuits fell in the category of 'like very much', Type-2 (10% seed powder) fell in the category of 'like moderately' and Type-3 (15% seed powder) fell in the category of 'like slightly'. The results of sensory evaluation of products showed that seed powder could be incorporated upto the level of 5%. The nutrient composition of the products revealed that all the supplemented biscuits had higher amount of crude fiber as compared to their respective controls.

Keywords: Sensory **c**haracteristics, nutrient composition, date seed powder, products.

Introduction

Date palm is an important and one of the oldest trees cultivated by man (Beech and Shepherd, 2001; Beech, 2003, Tengberg, 2003) [5, 4]. It has a good tolerance to cold and dry–hot climates. Date seeds constitute between 10 to 15% of date fruit weight (Hussein *et al.,* 1998) [7] and contain relatively high amount of protein (5.1g/100g) and fat (9.0g/100g) compared to date flesh. They are very rich source of dietary fiber (73.1g/100g), phenolics (3942mg/100g) and antioxidants (80400µmol/100g). The date seed have been used traditionally as the animal feed or grinded into smaller size and being roasted to turn it into caffeine-free coffee substitute, which have been commercialized by the Arabs in two types, whether plain or mixed with coffee (Rahman *et al*., 2007; Al-Farsi and Lee, 2011) [8, 1]. At present, date seeds are used mainly for animal feed. Utilization of such waste is very important as date seeds could potentially be considered as an inexpensive source of dietary fiber and natural antioxidants. The aim of this study was to utilize date seed powder in product development like biscuits, *sev* and *churan* and to study their sensory characteristics and nutrient composition.

Materials and Methods

Materials: Four varieties of date fruit, namely Hillawi, Khadrawi, Medjool and Shamran were procured in a single lot from the Department of Horticulture, College of Agriculture, CCS Haryana Agricultural University, Hisar. All the varieties of date fruits were cleaned and washed under tap water to remove dirt and dust. All washed dates were deseeded. The seeds of date were coarsely ground in pastle mortar and to the fine powder in an electric grinder. The dried powders were stored in air tight containers at room temperature for further use.

Development of biscuits using date seed powder: Three types of biscuits were prepared by using seed powder of all the varieties of date fruit. Type-I biscuit was prepared by using 5% seed powder, Type-II by 10% seed powder and Type-III by using 15% seed powder. Other ingredients used and method of preparation of biscuit is depicted in Table 1.

Table 1: Ingredients used and method of preparation of each product

Product	Ingredients	Method of Preparation
Biscuit	Refined flour (95g), Date seed powder (5g). milk (30g), ghee(65g), ground sugar(65g), sodium bicarbonate (a pinch), baking powder(a pinch)	Sieve refined flour and date seed powder together. Cream ghee, sugar and milk Add **s**odium bicarbonate and cream again. Add sieved flours and mix well. Knead a smooth dough keep in freezer for 30 min. for conditioning. Again knead dough. Make biscuits and bake at 160°C for 30 minutes.

The developed biscuits were evaluated organoleptically using a 9-Point Hedonic Scale prepared by a panel of ten judges selected from I.C. College of Home Science, CCS Haryana Agricultural University, Hisar. The biscuits were also analysed for their proximate composition (moisture, crude protein, fat, crude fibre and ash) using standard methods (AOAC, 2000) [2]. The results were statistically analysed using ANOVA.

Results and Discussion

Sensory evaluation of Biscuits

The data on the mean scores for the sensory characteristics of biscuits prepared by using seed powder of different varieties of date fruit are given in Table 2.The results revealed that sensory scores for colour, appearance, aroma, texture, taste and overall acceptability of biscuits prepared without of seed powder of date fruit (control) were 8.00, 7.80, 7.70, 7.65, 7.80 and 7.78

respectively, which were in the category of 'like very much'. The mean scores of Type-I biscuits of Hillawi variety were similar to control biscuits in terms of all the sensory characteristics. The mean scores for colour, appearance, aroma, texture, taste and overall acceptability of Type-II biscuits of Hillawi variety were 7.25, 6.80, 6.65, 6.95, and 6.83 respectively, which fell in the category of 'like moderately'. The Type-III biscuits of Hillawi variety had mean scores of 7.0, 6.35, 6.20, 6.00, 7.30 and 6.53 for colour, appearance, aroma, texture, taste and overall acceptability respectively,. All the sensory scores of Type-II and Type-III biscuits fell in the category of 'like moderately'.

The mean scores for appearance, aroma, texture, taste and overall acceptability of Type-I biscuits of Khadrawi variety were similar i.e. 7.25 and fell in the category of 'like moderately'. On the other hand colour was 'liked very much' by the judges. The mean scores for colour, aroma and overall acceptability of Type-II biscuits of Khadrawi variety were 7.40, 6.85 and 6.59 respectively, which were in the category of 'like moderately' whereas appearance, texture and taste having sensory scores of 6.30, 6.50 and 6.20 were in the category of 'like slightly'. The mean sensory scores of Type-III biscuits of Khadrawi variety for appearance, aroma, texture, taste and overall acceptability were 5.90, 6.40, 5.70, 5.55 and 6.31, respectively, which fell in the category of 'like slightly'; whereas sensory score for colour was (6.95) which fell in category of 'like moderately'.

The organoleptic evaluation score for Type-I biscuits of Medjool variety were similar to control biscuits in terms of all the sensory characteristic. The Type-II biscuits of Medjool variety had the mean scores of 7.80, 7.80 and 7.60 for colour, aroma and taste respectively, which were in the category of 'like very much'; whereas the appearance, texture and overall acceptability having sensory scores of 6.30, 6.50 and 6.59 were in the category of 'like moderately'. The Type-III biscuits of Medjool variety were 'liked moderately' in terms of all the sensory characteristics except texture which was 'liked slightly' by the judges.

The mean scores of Type-I biscuits of Shamran variety for colour, appearance, aroma and overall acceptability were 7.85, 7.65, 7.70 and 7.55 respectively, which fell in the category of 'like very much'. The scores for texture and taste were same i.e. 7.40 and fell in the category of 'like moderately'. The mean sensory scores of Type-II biscuits of Shamran variety were 6.75, 6.65, 6.60, 6.90 and 6.79 for appearance, aroma, texture, taste and overall acceptability, respectively, which fell in the category of 'like moderately' except colour (7.60) which was 'liked very much' by the judges. The mean scores of Type-III biscuits for aroma, texture and taste were same i.e. 6.05 which fell in the category of 'like slightly', whereas mean score for colour was 7.30 which fell in the category 'like moderately'. On the other hand mean scores for appearance (6.25) and overall acceptability (6.45) of type-III biscuits of Shamran variety fell in the category of 'like moderately'.

Overall, it was observed that supplemented biscuits prepared from seed powder of all the varieties were acceptable in terms of all the sensory characteristics, however the scores were higher in Type-I biscuits as compared to Type-II biscuits and Type-III biscuits. Ashoush and Gadallah (2011) [3] reported that biscuits fortified with 20% mango kernel powder showed highest score in overall acceptability as compared to other various concentrations of mango kernel powder. Halaby *et al*. (2014) [6] reported that pan bread fortified with 15% date seed powder showed the highest score in overall acceptability when compared to control pan bread and other various concentrations of date seed powder.

Table 2: Mean scores of sensory characteristics of biscuits incorporating seed powder of date fruits

	Sensory characteristics					
Biscuits	**Colour**	**Appearance**	**Aroma**	**Texture**	**Taste**	**Overall acceptability**
Hillawi biscuit	Scores					
Control	8.00±0.00	7.80±0.08	7.70±0.13	7.65±0.15	7.80±0.08	7.78±0.92
Type-I DSP:RF::5:95	8.26±0.20	7.90±0.22	7.85±0.24	7.85±0.28	8.00±0.29	7.90±0.25
Type-II DSP:RF::10:90	7.25±0.20	6.80±0.21	6.65±0.17	6.65±0.20	6.95±0.35	6.83±0.15
Type-III DSP:RF::15:85	7.00±0.31	6.35±0.30	6.20±0.29	6.00±0.26	7.30±0.47	6.53±0.27
CD(P≤0.05)	0.51	0.47	0.49	0.54	0.75	0.54
Khadrawi biscuit	Scores					
Control	8.00±0.00	7.80±0.08	7.70±0.13	7.65±0.15	7.80±0.08	7.78±0.92
Type-I DSP:RF::5:95	7.70±0.15	7.25±0.13	7.25±0.13	7.25±0.13	7.25±0.20	7.25±0.17
Type- II DSP:RF::10:90	7.40±0.22	6.30±0.20	6.85±0.17	6.50±0.13	6.20±0.19	6.59±0.15
Type- III DSP:RF::15:85	6.95±0.35	5.90±0.27	6.40±0.28	5.70±0.26	5.55±0.22	6.31±0.22
CD(P≤0.05)	NS	NS	NS	0.89	1.01	NS
Medjool biscuit	Scores					
Control	8.00±0.00	7.80±0.08	7.70±0.13	7.65±0.15	7.80±0.08	7.78±0.92
Type-I DSP:RF::5:95	8.15±0.26	7.95±0.22	7.95±0.22	7.95±0.30	7.85±0.28	7.79±0.25
Type-II DSP:RF::10:90	7.80±0.33	7.50±0.31	7.80±0.25	7.30±0.34	7.60±0.42	7.44±0.38
Type-III DSP:RF::15:85	7.40±0.34	7.30±0.30	7.20±0.36	6.40±0.40	6.70±0.45	7.28±0.29
CD(P≤0.05)	NS	NS	NS	0.89	1.01	NS
Shamran biscuit	Scores					
Control	8.00±0.00	7.80±0.08	7.70±0.13	7.65±0.15	7.80±0.08	7.78±0.92
Type-I DSP:RF::5:95	7.85±0.17	7.65±0.13	7.70±0.11	7.40±0.13	7.40±0.13	7.55±0.11
Type-II DSP:RF::10:90	7.60±0.16	6.75±0.21	6.65±0.21	6.60±0.21	6.90±0.21	6.79±0.16
Type-III DSP:RF::15:85	7.30±0.25	6.25±0.29	6.05±0.37	6.05±0.26	6.05±0.26	6.45±0.27
CD(P≤0.05)	NS	0.58	0.65	0.54	0.55	0.50

Values are mean ± SE of ten independent determinations

DSP: Date seed powder RF: Refined flour

Table 3 indicates that Control biscuit had significantly (P≤0.05) higher (4.19%) moisture content as compared to biscuits of varieties Medjool (3.50%), Khadrawi (3.49%), Shamran (3.49%) and Hillawi (3.90%). It is evident from the data that there was a non-significant (P≤0.05) difference in the crude protein, fat and ash content of all types of biscuits. The crude fiber content of all the seed powder supplemented biscuits was significantly (p≤0.05) higher than control biscuit.

Table 3: Proximate composition of biscuit incorporating seed powder of date fruits

Product (Date fruit variety)	Nutrients (%)				
	Moisture	**Crude Protein**	**Fat**	**Crude fiber**	**Ash**
Biscuit Control	4.19±0.01	6.38±0.20	22.11±0.70	1.54±0.02	0.50±0.01
Biscuit (Hillawi)	3.47±0.0	4.87±0.49	19.77±0.7	3.06±0.0	0.52±0.02
Biscuit(Khadrawi)	3.49±0.01	5.66±0.22	19.92±0.4	3.10±0.06	0.51±0.01
Biscuit (Medjool)	3.50±0.01	5.50±0.27	20.65±0.71	3.37±0.11	0.53±0.03
Biscuit (Shamran)	3.49±0.01	5.46±0.46	19.47±0.41	3.26±0.23	0.52±0.01
C.D. (P≤0.05)	0.02	NS	NS	0.39	0.02

Conclusion

It was found that biscuits incorporating 5% powder of date seed were liked very much and biscuits prepared from seed powder of Hillawi variety were highly acceptable. It was found that crude fiber increased significantly in all supplemented biscuits.

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