African J. Biol. Sci., 17 (1): 321-332 (2021)
ISSN 1687-4870 **e- ISSN 2314-5501 (online)**
www.ajbs.journals.ekb.eg **E.mail: aasdjournal@yahoo.com**

Chemical, sensory characteristics and texture profile of cupcake enriched with different proportions of Samwah herb (*Cleome droserifolia*)

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Received: November 12, 2021; Accepted: December 20, 2021; Available online: December 27, 2021

ABSTRACT

Bakery products and their derivatives have an important place in the food consumption all over the world. Cakes are bakery products high in fat and sugar. Samwah herb **(***Cleome droserifolia*) is one of the most popular medicinal herbs in Egypt. This work aims to enriches cupcake with different proportions of Samwah herb (2.5, 5, 10, 15 %) w/w and study its effect on cupcake chemical, sensory properties, physical, and texture profile. Results of chemical analysis showed that protein, ash, fiber and minerals were increased with increasing of samwah concentration. According to sensory evaluation the highest smell, taste, color, and general acceptance score was given to the sample containing 2.5% and 5% samwah, it was noted that with the increase of samwah percent the acceptance of cupcake decreases. Cupcake enriched with 2.5% samwah scored the highest weight, change in weight (%) and volume compared with the other enriched samples. According to texture analysis, the sample containing 10 % samwah was given the highest score on their texture qualitative properties, and cupcake enriched with 2.5% samwah received the lowest scores regarding their softness and hardness.

Keywords: Cake, Sensory properties, Texture profile, Herps.

INTRODUCTION

Interest in medicinal plants is reemphasized during the last decades and numerous medicinal plant species are being screened for their pharmacological activities and advancement of novelties in drug discovery. The use of traditional medicine and medicinal plants in most developing countries, as a normative basis for the maintenance of good health has been widely observed (Tiwai and Madhusudan, 2002).

Based on the astonishing proportion of 18.9% of total plant species around the world, FAO estimates the number of medicinal plant species to reach more than 50,000 (Schippmann *et al*., 2002). Despite the ancient nature of the tradition, it is estimated that 70–80% of people worldwide rely on medicinal plants to meet their primary health care needs and that 25% of pre-scription drugs contain active components derived from higher plants. Medicinal plants help in alleviating human suffering and are widely used for traditional remedies, pharmaceutical materials and trade (WHO, 1993; FAO, 2008).

Herbal medicines are promising choice over synthetic drugs, *Cleome droserifolia* medicinal herb belongs to Family Cleomaceae. The dried herb of *C. droserifolia*, locally named in Egypt Samwah and used as hypoglycemic plant by herbalists (Abdelfattah *et al*., 2019). It is one of the most popular medicinal herbs in Egypt and a common one to come across in the wadis of South Sinai, including around Dahab. It also has one of the most beautiful blooms. Samwah is an aromatic shrub covered in glandular hairs that give off a distinct scent that extends several meters from the plant, it grows in rocky, gravelly, and sandy desert wadis and plains. Older bushes are round and can grow quite large, up to 60 cm high.

Bedouin of South Sinai use samwah medicinally to treat a variety of ailments in both people and animals, including bee stings, internal and external infections, and diabetes (El-Seifi *et al*., 1993; Dina Aly and Rafik Khalil, 2019). *C. droserifolia* (samwah leaves) has an immediate effect on abdominal a rheumatic pains and inflammations. In addition, its extracts has specific biological effects in improving the carbohydrate metabolism (Mikhail, 2000).

Bakery products and their derivatives have an important place in the food consumption all over the world. Bread, pasta, bulgur, biscuits, cakes and breakfast cereals are the most consumed industrial cereal products (Hulya *et al*., 2017). Bakery products are consumed in large quantities on a daily base and have an important role in human nutrition. The addition of functional ingredients to bakery products has risen in popularity due to the ability to reduce risk of chronic diseases beyond basic nutritional functions (Eswaran *et al.*, 2013). Cake is one of the most common bakery products consumed by people in the world (Lean & Mohamed, 1999).Cakes are bakery products high in fat and sugar. Base ingredients include wheat flour, shortening, sugar, leavening agents, liquid (water, milk, or buttermilk), and eggs. Cake making requires the formation of a structure that supports these ingredients, keeping it light and delicate. Cakes can be divided in two main categories: foam and shortened. In foam type cakes (angel food, sponge, chiffon), the structure and volume depend on foaming and aeration properties of eggs. In shortened type cakes (pound cake, chocolate cake, etc.) the structure results from the fat-liquid emulsion created throughout batter processing (Conforti, 2006). Cake main attributes are structure, texture, moistness, color (brown crust), high volume, and sweet flavour (Martins *et al*., 2017).

The aim of the present study is to investigate chemical analysis of *Cleome droserifolia* (Samwah) powder and investigate the effect of substitute wheat flour with different proportions of Samwah herb on chemical, sensory properties, physical, and texture profile of cupcake.

MATERIALS AND METHODS

Ingredients:

Cleome droserifolia (Samwah) dried leaves were obtained from Haraz company for medical herbs. Wheat flour 72% extraction, sugar, butter, egg, baking powder, vanilla and skimmed milk were obtained from the local market in Cairo city, Egypt.

Chemical analysis of *Cleome droserifolia* (Samwah) powder:

Moisture, protein, fat, fiber, and ash contents of samwah powder were determined according to the methods of A.O.A.C (2005). The total carbohydrates were calculated by the differences. All proximate composition experiments were performed in triplicate and expressed as g/100 g of sample on dry basis. Mineral contents (calcium, potassium, sodium, magnesium, and manganese) were determined using a Pye Unicum SP1900 Atomic Absorption Spectroscopy instrument as described by A.O.A.C (2005).

The fatty acids content of *Cleome droserifolia* (Samwah) powder:

The fatty acids content of samwah powder was determined by the Laboratory of Food Technology Res. Institute using the methods of IOS 12966-2 (2017)

Processing of cupcake formulas:

Cupcake was made by five formulas; control, and four substituted formulas. Wheat flour (72% extraction) was substituted with four proportions of Samwah powder (2.5 , 5 ,10, and 15 % , respectively).

All formulas of substituted wheat flour with different proportions of Samwah powder were shown in Table (1) (Makpoul *et al*., 2017).

Table 1. Ingredients of cupcake.

Ingredients	Weight (g)				
	control	2.5%	5%	10%	15%
wheat flour (72% extraction)	250	243.75	237.5	225	212.5
Samwah powder	-	6.25	12.5	25	37.5
Sugar	125	125	125	125	125
Skimmed milk powder	25	25	25	25	25
butter	53.5	53.5	53.5	53.5	53.5
Fresh whole egg	110	110	110	110	110
Baking powder	12.5	12.5	12.5	12.5	12.5
Vanilla	2	2	2	2	2

The processing method of cupcake was taken typically according to AACC (2000) in steps sequence as: The butter has melted thoroughly sugar was added then mixed vigorously. The whole egg was mixed with vanilla and whipped until got puff and smooth like-cream texture. Additionally, substituted wheat flour (72% extraction) with baking powder and skimmed milk powder then added gradually to whipped egg mixture. This mixture was mixed gently until got homogenous dough using Hand mixer (MK-H4-W, Panasonic Co). After getting appropriate texture, the dough was poured into papercups and backed at 180°C ± 5°C for 30 to 35 min. The baked cupcakes were cooled down at room temperature, and then packed into aluminum foil bags intervals for analysis.

Chemical analysis of cupcake:

Moisture, protein, fat, crude fiber, ash, contents of the cupcakes was determined according to the methods of AOAC (2005). Total carbohydrates (TC) were calculated bydifference.Total Caloric Value Determination:Total Calories (kcal) was calculated using the next values: lipids 9kcal/g, proteins 4 kcal/g, and carbohydrates 4kcal/g (Merril and Watt, 1973). Minerals (manganese, magnesium, calcium, iron, and selenium) of cupcake samples were measured by using Atomic Absorption spectroscopy (AOAC, 2005).

Sensory evaluation of cupcake:

Sensory evaluation was performed on the cupcake samples on day 0 of storage. Cupcakes were evaluated for its sensory characteristics (appearance, taste, odor, color, and general acceptance). A total of 30 untrained person's different age participated in this study. The cupcake samples were cut into half for each panel. All cupcake samples were coded and tested for degree of liking or disliking using descriptive categories with a five-point hedonic scale: 1 to 5 representing (1) bad, (2) moderate (3) good, (4) very good, and (5) excellent (Dutcosky, 2011).

Physical characteristics:

The normal weight of baked cupcakes was individually determined within 1 h after baking. Also, volume in different substituted cupcakes was determined by method according to AACC (2002) and specific volume was calculated for these formulas [Volume (cm^3)/Weight (g)].

Texture Analysis of cupcake:

To conduct texture analysis compression test, some pieces of different treatments ($3\times3\times3cm^3$) were cut. Different parameters including hardness, resilience, gumminess, Chewiness, cohesiveness, and springiness were measured by texture Pro

CTV1.6 Build, using the methods of Szczesniak *et al.* (1963) and Bourne (1978).

Statistical analysis:

Data was expressed as mean ± SD and statistical significance was assessed using one-way analysis of variance (ANOVA) test. Statistical analyses were performed using the SPSS.

RESULTS AND DISCUSSION

Chemical analysis of *Cleome droserifolia* (Samwah) powder:

The content of moisture, protein, crude fiber, ash, and carbohydrate of Samwah powder, are shown in Table (2). It is obvious that Samwah powder contains high protein, ash, carbohydrates, and fiber (28.394, 34.757, 27.093, and 8.22 %, respectively). While noted low fat contain (1.536%). These findings agree with Jagdish *et al*. (2022) who reported that the seed oil and other species of *Cleome* possess high nutritional content. The seeds contain proteins, fatty acids, dietary amino acids, and lipids. Plants also possess high fiber content, fewer amounts of fat. Also, Majed *et al.* (2013) reported that *C. droserifolia* (samwah) herb ha glycoisdes and carbohydrates, cardenolides, saponins, sterols and triterpenes, tannins flavonoids, and amino acids. On another side Chweya and Nameus (1997) found that the 100 g of samwah leaves contained in average 81.8 - 89.6 % moisture, 3.1-7.7 % protein, 0.4 - 0.9 % fat, 4.4 - 6.4% carbohydrate, 1.3 - 1.4 % fiber, and 2.1 - 3.0 % ash.

Table (2): Chemical analysis of Samwah powder (g/100g dry sample).

	Protein %	% Fat	% Ach	%Crude Fiber	% Moister	T. C **
sample	28.394	1.536	34.757	8.22	9.045	27.093

T.C**= Total carbohydrates calculated by difference

The results revealed that Samwah have high values of Na (4266.88), Ca (2004.43), K (584.89) and Mg (495.05) mg/100g (Table 3). These results agreed with Jagdish *et al* (2022) who reported that cleome species is a rich source of minerals, and vitamins containing essential vitamins and minerals containing vitamin A. While Chweya and Nameus (1997) found that the 100 g of samwah leaves contained in average 213 - 434 mg calcium plus many other components.

Table (3): Minerals content of Samwah powder (mg/100g dry sample):

Minerals	Ca	K	Mg	Na	Mn
Sample	2004.43	584.89	495.05	4266.88	4.75

The fatty acids content of *C. droserifolia* (Samwah) powder

As showed in Table (4) Samwah has high content of Linoleic acid (C18:2 ω6) (50.27 %), Oleic acid (C18:1 ω9) (20.44 %), and Palmitic acid (C16:0) (11.84 %). This in agreement with the result of Jagdish, *et al.* (2022), Aboushoer *et al*. (2010), Abdel-Monem (2012), Jane and Patil (2012), Aparadh and Karadge (2010), Ahmad *et al*. (1984) who found that cleome is a rich source of essential oils, flavonoids, terpenoids, phenolic compounds, and alkaloids. It was found that, many plants of this genus are rich in their essential oil content either in the herb or in the seeds. 65 compounds forming about 99.3% of the total composition were identified in oil of *C. droserifolia*, while thirty compounds were detected and corresponding to 95.9% of the total in the oil of *C. trinervia***.** *Cleome genus*

comprises different chemical constituents (essential oils, terpenes, flavonoids, glucosinolates and alkaloids) and has many pharmacological functions including anti-diabetic, anticancer, antibacterial, anti-inflammatory, analgesic, antidiarrheal and antimalarial (Tripti *et al*., (2015).

Table (4) the fatty acids content of Samwah powder

Fatty acids	**%**	**Fatty acids**	**%**
Lauric acid (C12:0)	0.37	Oleic acid (C18:1 ω9)	20.44
Myristic acid (C14:0)	0.73	Linoleic acid (C18:2 ω6)	50.27
Pentadecanoic acid (C15:0)	0.15	Linolenic acid (C18:3 ω3)	0.71
Palmitic acid (C16:0)	11.84	Arachidic acid (C20:0)	2.19
Palmitoleic acid (C16:1 ω7)	0.21	Behenic acid (C22:0)	1.57
Heptadecanoic acid (C17:0)	0.22	Total unknown %	3.16
Stearic acid (C18:0)	3.48		

Ravi (2015) reported that fatty oils of the seeds of *C. droserifolia* contain major fatty acids, as methyl esters, of the oils mainly palmitic acid (10.2–13.4%), stearic acid (7.2–10.2%), oleic acid (16.9–27.1%) and linoleic acid (47.0–61.1%). Oil is rich in unsaturated fatty acids and nutrients, especially Vitamins A and C, minerals, calcium, iron and protein. Wael *et al*. (2016) found that in *Cleome africana and C. droserifolia*, fatty acids is a mixture of eight acids (saturated and unsaturated) and the major two acids are linoleic acid (38.99%) and palmitic acid (33.05%). Abd El-Gawad (2018) indicated that EO of the Egyptian ecospecies of *C. droserifolia* comprises mainly sesquiterpenes, in which cis-nerolidol, α-cadinol, δ-cadinene, and γ-muurolene were the major compounds, and allows it to be incorporated in the pharmaceutical and cosmetic industries.

The results of chemical analyses moisture, protein, Ash, fat, fiber, carbohydrateand total calories are given in Table (5). There was a significant difference between control cupcake and the four substituted formulas in moisture, protein, Ash, fat, fiber, carbohydrate and total calories. It was clear from data in Table (5) that sample containing 15% Samwah had the highest content of ach (2.55%), while sample containing 5% Samwah had the highest content of fiber (2.90 %), and carbohydrates (62.81 %). On another side sample containing 2.5 % Samwah showed a highest content of fat and total calories, (34.71 %), and (558.94 %), respectively. This can be explained due to the fact that samwah contains high levels of protein (28.394%), fiber (8.22%) and ash (34.757%) in its composition. Doweidar *et al*. (2016) indicated that by increasing the substitution levels of fat replacers in resulted cake led to an increase in protein, carbohydrates, ash, crude fiber. And with El- Nagger and Hassan (2018) who indicated that chemical composition of fat and/or sugar replaced cupcakes were high in ash content, crude fiber. Golmakani *et al*. (2015) showed that protein and ash contents increased by increasing Spirulina concentration. Zem *et al*. (2017) reported that cupcakes prepared with dry leaf flour presented high protein (7.69%) content and those with leaf meal stem presented a higher dietary fiber content (8.55%).

Table (5). The chemical analysis of cupcake.

Chemical analysis	Cupcake samples					F.	Sig.
	Control	2.5%	5%	10%	15%		
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
moisture	18.53 e ± 0.05	21.62 c ± 0.06	19.72 d ± 0.08	23.47 b ± 0.09	24.10 a ± 0.041	73074.9	0.00
protein	6.90 a ± 0.03	6.75 b ± 0.03	6.25 c ± 0.081	6.11 d ± 0.012	5.80 e ± 0.036	8.50	0.00
fat	26.70 c ± 0.08	34.71 a ± 0.051	26.49 d ± 0.071	33.97 b ± 0.052	26.38 e ± 0.09	96.50	0.00
ash	0.79 e ± 0.041	0.93 d ± 0.042	1.55 c ± 0.08	1.88 b ± 0.043	2.55 a ± 0.043	100.56	0.00
fiber	2.24 e ± 0.01	2.72 b ± 0.01	2.90 a ± 0.041	2.50 d ± 0.062	2.57 c ± 0.041	22867.5	0.00
carbohydrate	63.37 a ± 0.09	54.90 e ± 0.08	62.81 b ± 0.063	55.54 d ± 0.09	62.70 c ± 0.035	22506.0	0.00
Total calories	521.36 c ± 0.82	558.94 a ± 0.03	514.68 d ± 0.048	552.35 b ± 0.07	511.44 e ± 0.08	10.58	0.00

** Each value represents the mean ± SD (standard deviation); statistically significance compared with control group. The alphabet, a,b,c,d,e were the statistical difference between treatment groups and control group.

Table (6) shows the minerals content (%) in cupcake samples enriched with Samwah. Since the ashes are linked to the presence of mineral salts, we also noticed higher levels of most minerals in the samples enriched with samwah. Calcium is a vital mineral in human nutrition, its deficiency leads to many health problems the most one is osteoporosis. Samwah is a good source of calcium. From Table (6) it was obvious that sample containing 15% Samwah had the highest Ca, Mn, Mg, P, Fe, and Se content among other samples. Minerals content of cupcake samples increased by increasing Samwah concentration. It is referring to samwah high content of different minerals. This finding is in accordance with the results of study conducted on the cookies enriched with Spirulina (Salehi *et al*., 2012). And with El- Nagger and Hassan (2018) who indicated that Fe, Zn, Ca and Mg contents were significantly improved in fat and/or sugar replaced cupcakes. Zem *et al*. (2017) reported that both cupcakes presented satisfactory results for the phosphorus, sodium, magnesium, copper, and zinc minerals.

Table (6). Mineral content of cupcake (%).

Cupcake sample	Mn	Mg	P	Ca	Fe	Se
	Mean					
control	32.30b	151.8d	799.0c	268.60d	63.23d	0.29 c
2.5%	35.00ab	150.7d	782.5c	270.54d	68.06d	0.36c
5%	37.27ab	184.45c	871.5bc	342.80c	76.20c	0.38b
10%	39.00a	214.25b	949.0b	463.59b	90.60b	0.45b
15%	39.83a	263.251a	1094.0a	562.44a	112.63a	0.49a

** Each value represents the mean. statistically significance compared with control group. The alphabet, a,b,c,d,e were the statistical difference between treatment groups and control group.

Sensory evaluation of cupcake:

Attributes as aroma and taste are probably the most important features affecting sensory properties of food products added with different ingredients. The average of sensory scores for appearance, smell, color, taste, and general acceptance characteristics of all cupcakes are shown in Table (7).The results showed that there was a significant difference in appearance, smell, color, taste, and general acceptance characteristics among the investigated samples ($p > 0.05$). The highest smell, taste, color, and general acceptance score was given to the sample containing 2.5% and 5% samwah, while the sample containing 15% samwah was the most refused one and have undesirable taste, color, and general acceptance comparing to the sample containing 2.5% and 5%. It is noted that with the increase of samwah percent the acceptance of cupcake decrees. This result agrees with Makpoul *et al*. (2017) who found that the highest smell, taste score was given to the sample containing 25 and 50% concentrate protein of Jojoba and Moringa. And with the studies of Al-Sayed and Ahmed (2013), Ramcharitar *et al.* (2005), Moraes *et al.* (2010), Dutcoski (2011) and disagree with Golmakani *et al*. (2015). According to sensory evaluation results, there were no significant differences among different treatments in general acceptance. Also, disagree with Doweidar *et al.* (2016). Sensory properties indicated no significant difference between control and samples of cake at substitution levels 75% for simples' gel and 50% for maltodextrin gel.

Table (7). Sensory characters of cupcake

Sensory characters	Cupcake samples					F.	Sig.
	control	2.5%	5%	10%	15%		
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean± SD		
appearance	99.33 b ± 0.82	100.00 a ± 0.21	90.00 c ± 0.09	80.00 d ± 0.14	75.00 e ± 0.64	56.00	0.00
smell	99.33 a ± 1.03	99.00 a ± 0.45	95.00 b ± 0.53	75.00 c ± 0.08	50.00 d ± 0.75	12.69	0.00
color	99.50 a ± 0.84	95.00 b ± 0.87	90.00 c ± 0.04	70.00 d ± 0.16	40.00 e ± 0.19	257.71	0.00
taste	99.50 a ± 0.55	97.00 b ± 0.34	85.00 c ± 0.76	65.00 d ± 0.36	30.00 e ± 0.08	820.00	0.00
general acceptance	99.83 a ± 0.41	98.00 b ± 0.71	95.00 c ± 0.46	60.00 d ± 0.07	20.00 e ± 0.091	215764.0	0.00

** Each value represents the mean ± SD (standard deviation); statistically significance compared with control group. The alphabet, a,b,c,d,e were the statistical difference between treatment groups and control group

Physical characteristicsof cupcake:

It is clear from results in Table (8) that there was a significant difference in weight after backing, change in weight (%) and volume between control cupcake sample and enriched with samwah. The present data indicated that baked cupcakes with different levels of samwah had higher values as percentage of weight and volume as compared to control. Sample with 2.5% samwah scored the highest weight, change in weight (%) and volume compared with the other enriched samples. While, there was no significant difference in specific volume between control sample and samples with 2.5% and 10% samwah, whereas it was significant difference between samples with 5% samwah and the other samples. This finding agrees with the study of Hijazi and El-Gazar (2018) who reported the lowest weight and volume values after baking of baked cupcakes with

different levels of SPF compared to that prepared with 100% WF. While, it disagree with Doweidar *et al*. (2016).The values of height and specific volume in all the samples of produced cake were decreased by increasing the level of substitution of the previous two sources of fat replacers, while weight values were increased. Also, it agrees with Makpoul *et al*. (2017) who reported that increasing of Jojoba and Moringa protein substitution level increased weight property and could lead to decrease the volume and specific volume thinks to influence on gluten net with low strength and gas retention.

Table (8). Cupcake samples weight (g), change in weight (%), height (cm), volume (cm^3) and specific volume (g/cm^3).

	Cupcake samples					**F.**	**Sig.**
	control	**2.5%**	**5%**	**10%**	**15%**		
	Mean ± SD	**Mean± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**		
weight after backing (g)	84.56c± 0.55	87.14a± 1.04	85.45cb± 0.93	86.05b± 0.71	85.53 cb ± 1.18	6.45	0.00
weight before backing(g)	93	93	93	93	93	0.00	1.00
Change in weight (%)	90.93c± 0.59	93.70a± 1.12	91.89cb± 1.00	92.52b± 0.76	91.96 cb ± 1.27	6.45	0.00
Height (cm)	5.20a ± 0.09	4.93b± 0.14	4.90 b ± 0.27	4.80b ± 0.09	4.93b± 0.14	5.27	0.00
Volume (cm3)	119.40b± 1.17	122.50 a ± 1.29	120.90ba± 0.85	120.87ba ± 0.66	122.50 a ± 1.25	3.46	0.02
Specific volume (g/ cm3)	0.71 a± 0.01	0.71a± 0.01	0.71ba± 0.00	0.71a ± 0.01	0.70b± 0.01	3.03	0.04

** Each value represents the mean ± SD (standard deviation); statistically significance compared with control group. The alphabet, a,b,c,d,e were the statistical difference between treatment groups and control group

Texture Analysis of cupcake:

In TPA, two variables like chewiness and gumminess are respectively defined as the required energy for oral digestion of a solid food and for decomposition of a semi-solid food for its ingestion **(**Szczesniak, 1995). Table (9) shows the results of texture analysis for cupcake samples enriched with Samwah. These results showed that there was a significant difference in hardness, cohesiveness, chewiness springiness, and gumminess between control sample and samples enriched with samwah. As shown in Table (9) the highest chewiness springiness, gumminess and hardness were observed for the treatment containing 2.5% samwah. The lowest hardness, chewiness, and gumminess were found for the treatment containing15 %. According to previous studies, gumminess and chewiness both are affected by hardness (Esteller *et al*., 2004).

According to the results of texture analysis of the enriched cupcake samples, the sample containing 10 % samwah was given the high score on their texture qualitative properties, because this sample had the lowest amount of texture hardness than other samples. It was noted that sample containing 2.5% samwah received the lowest scores regarding their softness and hardness.The highest cohesiveness was for 5% samwah. This finding is in agreement with the results of Marchylo *et al*. (2004) and Golmakani *et al*. (2015) who found that the lowest hardness and chewiness were observed for the treatment containing the highest concentration of Spirulina. While, these findings disagree with Makpoul *et al*. (2017) who reported that cupcake containing 25% and 50%

Jojoba and Moringa concentrate protein were given the high score on their texture qualitative properties, and the sample containing 75% receive the lowest scores.

Table (8). Texture Analysis of cupcake.

Texture Analysis	Cupcake samples					F.	Sig.
	control	2.5%	5%	10%	15%		
	Mean ± SD	Mean± SD	Mean± SD	Mean ± SD	Mean± SD		
Adhesiveness (mJ)	0.40 a ± 0.08	0.20 c ± 0.06	0.30b ± 0.041	0.30b± 0.05	0.40a± 0.01	192.26	0.00
Resilience	0.21 c ± 0.01	0.23 b ± 0.04	0.25a ± 0.03	0.19d± 0.06	0.19d± 0.02	181.17	0.00
hardness (N)	22.70 a ± 0.12	22.12 b ± 0.43	14.54 d ± 0.51	14.11e± 0.03	15.33c± 0.041	205.93	0.00
cohesiveness	0.55 c ± 0.01	0.56 b ± 0.03	0.59a± 0.01	0.50d± 0.06	0.48e± 0.01	761.25	0.00
springiness (mm)	7.33 a ± 0.05	7.30 b ± 0.12	6.51c± 0.041	6.28d± 0.04	5.17e± 0.05	65.88	0.00
gumminess (N)	14.71 b ± 0.09	14.97 a ± 0.012	10.05 c ± 0.042	8.44e± 0.14	8.90d± 0.24	29.56	0.00
chewiness (mJ)	107.80 b ± 0.06	109.30 a ± 0.05	65.40 c ± 0.04	53.00d± 0.01	46.00e± 0.03	689.99	0.00

** Each value represents the mean ± SD (standard deviation); statistically significance compared with control group. The alphabet, a,b,c,d,e were the statistical difference between treatment groups and control group

Conclusions:

Samwah reported high content of Linoleic acid, Oleic acid, and Palmitic acid. In addition, it is a rich source of essential oils, flavonoids, terpenoids, phenolic compounds, and alkaloids. In the present study enriching cupcake with deferent percent of *C. droserifolia* **(**Samwah) affected the cupcake chemical composition of protein, ash, fiber and minerals were increase within increase of samwah concentration. According to sensory evaluation the highest smell, taste, color, and general acceptance score was given to the sample containing 2.5% and 5% samwah, While the sample containing 15% samwah was the most undesirable taste, color, and general acceptance. It is noted that with the increase of samwah percent the acceptance of cupcake decrees. Cupcake enriched with 2.5% samwah scored the highest weight, change in weight (%) and volume compared with the other enriched samples. According to texture analysis of the enriched cupcake, the sample containing 10 % samwah was given the high score on their texture qualitative properties, and cupcake enriched with 2.5% samwah received the lowest scores regarding their softness and hardness.

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الخصائص الكيميائية والحسية وخواص القوام للكب كيك المدعم بنسب مختلفة من عشبة السموة

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المستخلص

تحتل المخبوزات ومشتقاتها مكانة مهمة في الاستهلاك الغذائي في جميع أنحاء العالم. الكعك من منتجات المخابز التي تحتوي على نسبة عالية من الدهون والسكر. تعد السموة من أشهر الأعشاب الطبية في مصر. يهدف هذا العمل إلى إثراء الكب كيك بنسب مختلفة من عشبة السموة (2.5 ، 5 ، 10 ، 15٪) ودراسة تأثير هذا الاثراء على خصائص الكب كيك الكيميائية ، والحسية ، والفيزيائية ، وخواص القوام . أظهرت نتائج التحليل الكيميائي زيادة محتوى الكب كيك من البروتين والرماد والألياف والمعادن مع زيادة تركيز السموة. وبحسب التقييم الحسي أعطيت أعلى درجة من حيث الرائحة والطعم واللون ودرجة القبول العامة للعينة التي تحتوي على 2.5٪ و 5٪ سموة ، علما أنه مع زيادة نسبة السموة انخفضت درجة تقبل الكب كيك. سجل الكب كيك 2.5٪ سموة أعلى درجة من حيث الوزن والتغير في الوزن (٪) والحجم مقارنة بالعينات الأخرى. وفقًا لتحليل خواص القوام حصلت العينة المحتوية على 10٪ من السموة على قيمة مرتفعة في الخصائص النوعية لقوامها ، فى حين ان الكب كيك بنسبة 2.5٪ سموة كانت أقل من حيث نعومتها وصلابتها.

الكلمات المفتاحية : الكيك ، الخواص الحسية ، خواص القوام ، الاعشاب .