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Effect of Basil Leaves Extracted Juice Addition on Mayonnaise and Cake Oxidative Stability and Their Sensory Characteristics.

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Abstract: ***The effect of basil leaves juice (BLJ) levels ranged between 0% and 1.5% on oxidative stability, and sensory characteristics of mayonnaise and cake were studied during 12 weeks for mayonnaise or 6 week for cake storage period. The pH value of mayonnaise significantly (P < 0.05) decreased with increasing storage period. Its decreasing rates in mayonnaise samples prepared using 1.0 and 1.5% (BLJ) were significantly (p< 0.05) lower than that in the control. In addition, the treated samples had acid values significantly lower than that of the control sample at the end of storage period. After mayonnaise storage for 12 weeks, the values of peroxide were 23.2, 7.8 and 5.3 meq kg^{-1} at levels 0.5, 1.0 and 1.5% addition respectively, acid values were 3.9, 3.0 and 2.8mmol kg-1 for the same levels respectively, while peroxide values were 6.2, 4.7 and 3.8meq kg^{-1} at levels 0.5, 1.0 and 1.5% addition respectively, acid values were 3.4, 3.0 and 1.8mmol kg^{-1} for the same levels respectively after cake storage for 6 weeks, respectively, for cake prepared using 0.5, 1.0% and 1.5% (BLJ) with a significant differences with the control sample after 12 week of storage to mayonnaise that had 4.8mmol kg^{-1} and 28.9meq kg^{-1}, respectively. While in cake control sample after 6 week storage period there were 1.8mmol and 3.4 meq, respectively. Used concentrations at 1.0% and 1.5% of (BLJ) saved the sensory characteristics during storage period compared to the control sample which was refused at the end of storage after 12 weeks for mayonnaise and 6 weeks in cake. Baking quality of cakes was improved by (BLJ) addition at levels (0.5, 1.0 and 1.5%) and butylated hydroxytoluene BHT as a synthetic antioxidant. The results indicated no major changes were found in all baking quality parameters of cake. L* (lightness), a* (redness) and b* (yellowness) showed that the presence of (BLJ and BHT) produced lighter color compared to the untreated sample. (BLJ and BHT) were retarded cake rancidity and extended the storage period from 3 weeks in control to more than 6 weeks. (BLJ) was selected as natural antioxidants performing better than BHT.***

Keywords: oxidative stability- acid values- sensory characteristics – natural antioxidants

1. Introduction

The antioxidant activity of herbs and spices were extensively studied [1], and several of their health benefits were determined [2]**.** From time immemorial, herb extracts were used for preserving the quality of soybean oil [3]**,** beef [4]**,** meat, poultry, fish [5] and beef burger [6].

The *Ocimum* genus comprises more than 150 species and is considered as one of the largest genera of the Lamiaceae family grows wild in the Mediterranean basin [7]**.** Sweet basil is an annual herb which grows in several regions all over the world. The plant is widely used in food and oral care products. The essential oil of the plant is also used as perfumery [8]**.** *Ocimum* spp. contain a wide range of essential oils rich in phenolic compounds and a wide array of other natural products including polyphenols such as flavonoids and anthocyanins [9]**.**

Basil is one of the species used for the commercial seasoning. It is commonly known that the presence of essential oils and their composition determine the specific aroma of plants and the flavor of the condiments. Basil used frequently in soups, desserts, pickles, pizza, spagetti sauce, egg, cheese dishes, tomate juice, dressings, confectionery, salads, meat products etc. souces, vinegars, pickles, ketchups, beverages, condiments and confectionery goods as a flavoring agent [10]. Also, basil is well known as a plant of a folk medicinal value and as such is accepted officially in a number of countries [11]**.** Also, basil tea taken hot is good for treating nausea, flatulance and dysentery [12]**.** Also important part of toiletry products such as mouth washes and dental creams [13].

The essential oil has antifungal, physicochemical and insect-repelling activity, antioxidant activities [14]**.** The plant used as sources of antioxidants to enhance health and food preservation [15]**.** These effects have been attributed to antioxidant components such as plant phenolics, including flavonoids and phenylpropanoids among others [16,17].

It is also regarded as highly antiseptic and has been applied in both to prevent postpartum infections. One can inhale the vapors of the infusion of the leaves of basil or take a bath to improve the general conditions and to ameliorate the respiratory function [7]**.** During the past few years there has been a marked increase in the interest shown in the herbal spices [18]. The essential oil is a liquid with lightly yellowish color and a characteristic smell. The yield of essential oil from different plant parts varies between 0.15–1.59%, and it depends also on the seasonal factor and locality.

The plant has carminative, stimulant, antipyretic, anti-fungal and anti-bacterial properties [19]. Antioxidants may act as free radical quenchers, reducing compounds and singlet

oxygen scavengers and as pro-oxidant metals suppressors [20].

Basil extract has been strong radical scavenging and antioxidant activities [21]. Several active components are present in Basil, the major active ingredients are linalool, 1,8-cineol, eugenol, methyl cinnamate, iso caryophyllene and α-cubebene [22]. And linalool, camphor, 1,8-cineole, limonene and camphene [23]. Previously, as the characteristic compounds of basil essential oil linalool, methyl chavicol, eugenol, estragol, thymol and *p*-cymen were found [7,24].

Basil has high antioxidant activity and it was similar to tertiary butyl hydroquinone (TBHQ), butylated hydroxyl anisole (BHA), and butylated hydroxyl toluene (BHT) combined [25,21].

Essential oil of basil has been found to be beneficial for the alleviation of mental fatigue, colds, spasm, rhinitis, and as a first aid treatment for wasp stings and snakebites [12], treatment of headaches, coughs, diarrhea, constipation, warts, worms, and kidney malfunction [26], carminative, galactogogue, stomachic and antispasmodic medicinal plant in folk medicine [27,28]. Antiviral and antimicrobial activities of this plant have also been reported [29,25], febrifuge and antimalarial plant. Thus, infusion of the plant is used for gouty joints, cephalalgia and gargle for foul breath. Relief in irrigation for throat, earache and ring worm [13], alleviation of mental fatigue, colds, spasms, rhinitis, used in folk medicine as a tonic and vermifuge, overview the basil tea taken hot is good for treating nausea, flatulence, and dysentery [12], Nematicidal [30], fungistatic [31] and antimicrobial properties [32].

Mayonnaise is a widely consumed food product [33]. Mayonnaise is a kind of semi-solid oil-in-water emulsion that prepared by emulsifying the oil with other components like egg, vinegar, and mustard. In multiphase systems, oxidative reactions are an interfacial phenomenon, which are affected by a wide number of different factors, such as the chemical composition and the physicochemical properties of the oil and water phases, the types of surfactants, and the surface area of the oil phase [34,35]. Interfacial oxidation is of a great concern to the emulsified foods like mayonnaise because it affects in the storage stability [36]. Normally, synthetic antioxidants like BHA, BHT, and TBHQ are used to depress rancidity of fats and oils. However, the toxicity of synthetic antioxidants [37] and increasing consumer demand for natural products have directed our attention toward the edible plants as resources of safer and more effective natural antioxidants. Therefore, the objective of this study is to evaluate the utilization of (JBL) in mayonnaise and cake preparation for improving its oxidative stability. The effect of (JBL) on the sensory characteristics of prepared mayonnaise and cake were also studied.

The most widely used synthetic antioxidants in food (butylated hydroxytoluene BHT, butylated hydroxyanisole BHA) are very effective in their role as antioxidants. However, their use in food products has been failing off due to their instability, as well as due to a suspected action as promoters of carcinogenesis [38]. For this reason, there is a growing interest in the studies of natural healthy (non toxic) additives as potential antioxidants [25.21]. Essential oil from aromatic and medicinal plants has been known to possess biological activity, notably antibacterial, antifungal and antioxidant properties [25].

This study aimed to (1) retard rancidity rate in mayonnaise and cake by using natural antioxidant mater so it low bad side effects to human compared to others synthetic antioxidant as BHT. (2) Study the changes in peroxide values and acid values of products were treated with basil leaves juice and its effects on sensory evaluation of both products under this study and hunter properties of cake.

2. Materials and Methods

2.1 Materials

All ingredients used to prepare the mayonnaise, such as corn oil, egg, salt, sugar, lemon juice, vinegar, mustard, white pepper, baking powder, vanilla, flour and dried skim milk were purchased from a local market.

2.2 Methods

Basil Leave Juice Extraction
Leaves juice extracted by mixing 200g basil leaves in electric mixer mixer (Moulinex blender type 721, France) for 3 min after that centrifuged at 3000 rpm/10 min at 4^{o}C, the juice butted in glass bottles and kept at 4^{o}C until using.

Preparation of Mayonnaise
Mayonnaise control sample was prepared using the formula contained the following ingredients in percentage (w/w): corn oil 70, whole egg 19.1, salt 1.0, sugar 0.6, lemon juice 1.6, vinegar 5.6, mustard 1.8, and white pepper 0.3. The preparation was carried out by mixing egg and vinegar together and then all other ingredients using electric mixer (Moulinex blender type 721, France) on liquefy velocity for 5s. Then, the oil was added to the system on puree velocity and more rapidly after the mass begins to thicken, with raising gradually the velocity from puree to liquefy during 50s. All ingredients were homogenized on liquefy velocity for 20s. The treated mayonnaise samples were prepared using Juice of basil leaves (JBL) at different concentrations of 0.5%, 1.0% and 1.5%. The prepared mayonnaise samples were packed in 100g size glass bottles with screw cap and stored at ambient temperature (20^{o}C±5). Samples were taken after making and each 3 weeks intervals in three replications till 12 weeks at room temperature for measuring pH, and analysis for their lipid oxidative rancidity and sensory evaluations.

Cake Making
Cake making was carried out at automatic commercial baking line according to [39]. The cake ingredients were100g flour, 104 g sugar, 40 g shortening, 56 g egg albumen, 11.5 g skim milk, 5.8 g baking powder, 0.5 g vanillia, 1g emulsifier agent (Glecrid Mono Stearat) and 64ml water with modification didn't added the skim milk. The cake was manufactured as follows: The sugar and shortening were mixed together and the egg albumen was added and the mixture was whipping. The other components

were added and the whipping process was completed and after that, the paste was put in bowel and baking at 170-175°C for 35-40min. After two hours the organoleptic evaluation test was carried out. The cakes were allowed to cool at room temperature for 2 h before being packaged in polyethylene bags and stored at room temperature for further analysis.

pH Measurement

pH values of mayonnaise samples were measured at a temperature of 25 °C±0.5 using a HANA pH meter (SA 520, USA) according the procedure of [40]. Three replicates for three different samples were taken for each pH measurement.

Titratable Acidity:

Titratable acidity as % citric acid was determined by titrating the pulp with 0.1 N NaOH according to the standard procedure of [41].

Oxidative Stability Measurements

According to [41], lipids were extracted from mayonnaise samples, and acid and peroxide values of extracted lipids were determined. thiobarbituric acid (TBA) was carried out according to the method described by [42,43].

Color Parameters

The color of the tested sheets was measured using a spectro-colorimeter (Tristimulus color Machine) C/E lab color scale (Hunter, Lab Scan XE, Germany) Calibrated with a white standard tile of hunter lab color standard (LX No. 16379): X=77.26, y-81.94 and Z=88.14 (L*=92.71; a*=-0.89; b*=-0.18). Describe the color change during drying as explained by [44].

Sensory Evaluation

Seven sensory characteristics of prepared mayonnaise and cake samples were evaluated after preparation as well as after 12 weeks storage for mayonnaise or 6 weeks storage for cake at ambient temperature. References taste panel including the characteristics of appearance, color, taste, flavor, consistency, mouth feel, and overall acceptability was conducted by ten members preference taste panel, from staff of the Department of Food Technology, National Research Center According to [45].

Statistical Analysis

The obtained data were exposed to analysis of variance. Duncan multiple range at 5% level of significance was used to compare between means. The analysis was carried out using the PROC ANOVA procedure. The protective factors and the rheological flow parameters calculated by regression analysis that carried out using PROC REG procedure. Analysis of variance and regression analysis procedure were carried out using Statistical Analysis System [46].

3. Results and Discussion

3.1 pH Value

The pH value in different mayonnaise samples was the same being 4.2 and not affected by adding different concentrations of BLJ at zero time (Table 1). It significantly ($P < 0.05$) decreased with increasing the storage period till the 12 weeks. The pH decreasing rates in different samples were affected by adding BLJ. The values were ranged between 3.0 and 4.1 at the end of storage period. As a result of activity of lactic acid bacteria, the mayonnaise pH decreased during storage period [47]. It was noticed that increasing the BLJ concentration lead to reducing bacterial activity and retarding the decreasing of pH values as a result of its antibacterial effect. [48] Reported that BLJ can be used for the development of broad spectrum antibiotics. These obtained data are agreed with [49,50], and they found that the pH values decreased continuously in mayonnaise samples during storage period.

Table 1: pH values of mayonnaise samples prepared by using different basil leaves juice concentrations

Storage period (week) at room temperature	*BHT*	*Basil leaves juice concentrations*			
	0.01%	0.0%	0.5%	1.0%	1.5%
0 week	4.2	4.2	4.2	4.2	4.2
3 weeks	4.2	3.3	4.0	4.1	4.1
6 weeks	4.1	3.2	3.8	3.9	4.1
9 weeks	4.1	3.1	3.6	3.9	4.1
12weeks	4.0	3.0	3.5	3.7	3.8

Values are mean (n= 3)± standard deviations.

3.2 Oxidative Stability

Peroxide Value:

Fats oxidation is accelerated by reactions that take place at the surface of oil-in-water emulsion droplets [51]. Hydro peroxides were measured to determine the initial rate of oxidation because they are generally accepted as the first product formed by oxidation [52]. Consequently, [53] predicated that peroxide value was the best test for early oxidation of mayonnaise oil. The peroxide values were significantly ($P < 0.05$) increased in the prepared samples with the elongation storage period reaching to their highest values after 12 weeks in mayonnaise, or after 6 weeks in cake samples. The addition of BLJ at concentrations 1.0% and 1.5% could retarded the increase in peroxide value in prepared mayonnaise or cake samples, and it reached its minimum values of 7.8 and 5.3 meq kg^{-1} fat, respectively in mayonnaise, but there values in cake samples were 4.7 and 3.8 meq kg^{-1} fat at the same concentrations in the end of storage periods (Table 2,3). The obtained data for inhibiting the fat peroxidation were confirmed by the results of [54]. [55] illustrated that the hydrophobic antioxidants are directed toward the fat–water interface and prevent the fatty phase from oxidation. After 12 weeks storage of the mayonnaise control sample or 6 weeks storage of the cake control sample, the peroxide value arrived to its highest value of 28.9 meq kg^{-1} fats in mayonnaise control sample and 8.4 meq kg^{-1} fats in cake control sample with significant difference ($p < 0.05$) compared to all the other prepared samples. High concentration of the BLJ showed a great antioxidant activity. The antioxidant activity that appeared in the prepared mayonnaises and/or cake was due to the phenolics content in BLJ [50]. Some phenolic compounds have been found to have an intermediate strong inhibiting effect on peroxide value [56]. The antioxidant activities of phenolic compounds can occur from 3 mechanisms as chain-breaking antioxidant, hydro peroxide destroyer, and metal chelator [57, 58]. BLJ

had a high antioxidant activity with non-significant difference (P >0.05) compared to BHT combined [59].

Table 2: Peroxide value (meq kg^{-1}) of fat extracts of mayonnaise samples prepared by using different Basil leaves juice concentrations

Storage period (week) at room temperature	*BHT*	*Basil leaves juice concentrations*			
	0.01%	0.0%	0.5%	1.0%	1.5%
0 week	0.22	0.22	0.22	0.22	0.22
3 weeks	1.1	1.9	1.5	1.4	1.3
6 weeks	1.6	18.8	16.5	4.6	2.2
9 weeks	2.9	24.9	17.9	6.3	4.8
12weeks	3.4	28.9	23.2	7.8	5.3

Values are mean (n= 3)± standard deviations.

Table 3: Peroxide value (meq kg^{-1}) of fat extracts of cake samples prepared by using different Basil leaves juice concentrations

Storage period (week) at room temperature	*BHT*	*Basil leaves juice concentrations*			
	0.01%	0.0%	0.5%	1.0%	1.5%
0 week	0.2	0.2	0.2	0.2	0.2
2 weeks	1.0	2.6	1.9	1.2	1.0
4 weeks	2.1	5.4	3.3	2.5	2.2
6 weeks	3.4	8.4	6.2	4.7	3.8

Values are mean (n= 3)± standard deviations

Acid Value

The acid value of extracted lipids was used as a measure of lipid hydrolysis that leads to release of free fatty acids. Data present in Tables 4,5 indicated that acid values of mayonnaise or cake extracted lipids gradually increased with significant difference (P< 0.05) versus storage period reaching their maximum after 12 weeks in mayonnaise or 6 weeks in cake. Control sample had acid value significantly (P< 0.05) higher than other samples prepared using different concentrations of BLJ. The increase in acid value could be mainly attributed to the activity of acid tolerant microorganisms such as lactic acid bacteria which present in the aqueous phase in mayonnaise [60,61]. Also, in cake or mayonnaise these increases were probably due to the activity of hydrolytic and oxidative enzymes present in eggs [62]. On the other hand, it could be noticed that increasing the BLJ concentration in mayonnaise or cake samples significantly (P< 0.05) inhibits the progress in acid value. It may due to the phytochemicals of BLJ which have longed been known as their antibacterial properties [63]. As mentioned in Tables 4,5 the acid values ranged between 2.8 and 4.8 mg KOH g^{-1} in fat extracts of mayonnaise sample prepared with 1.5% BLJ and control sample, respectively. While there values 1.8 and 4.1 mg KOH g^{-1} in fat extracts of cake sample prepared with 1.5% BLJ and control sample, respectively. Output data from the regression analysis of acid values versus the storage period appeared the relation between BLJ concentrations and acid values. The protective value increased with increasing the BLJ concentration as it reached to its maximum values of 3.0 and 2.8 in the mayonnaise samples prepared using 1.0% and 1.5% BLJ. But there values in the cake samples prepared using 1.0% or 1.5% BLJ were 3.0 and 1.8 respectively.

Table 4: Acid value (mg KOH g^{-1}) of fat extracts of mayonnaise samples prepared by using different Basil leaves juice concentrations

Storage period (week) at room temperature	*BHT*	*Basil leaves juice concentrations*			
	0.01%	0.0%	0.5%	1.0%	1.5%
0 week	0.1	0.1	0.1	0.1	0.1
3 weeks	0.7	2.9	2.5	2.1	2.0
6 weeks	1.4	3.7	3.1	2.5	2.3
9 weeks	1.9	4.3	3.7	2.8	2.6
12weeks	2.1	4.8	3.9	3.0	2.8

Values are mean (n= 3)± standard deviations.

Table 5: Acid value (mg KOH g^{-1}) of fat extracts of cake samples prepared by using different Basil leaves juice concentrations

Storage period (week) at room temperature	BHT	Basil leaves juice concentrations			
	0.01%	0.0%	0.5%	1.0%	1.5%
0 week	0.2	0.2	0.2	0.2	0.2
2 weeks	0.8	2.8	2.2	1.9	1.2
4 weeks	1.4	3.5	2.9	2.4	1.5
6 weeks	1.8	4.1	3.4	3.0	1.8

Values are mean (n= 3)± standard deviations.

Color Characteristics

Color characteristic is a major criterion that affects the quality of the final product. The fortified BLJ addition to cake showed a difference in color compared to the control sample. The slight improvement in color was interpreted as an intense color and it was dependant on the addition level. Mean color values of cake of different treatments are recorded in Table (6). Data in the same table showed Hunter values of whiteness (L), redness (a) and Yellow (b) measured for surfaces colors. All fortified samples had slightly higher L values for crust than the control. All cakes treated with BLJ, had higher crust L values than the control, indicating lighter color, it was due to the BLJ had a great antioxidant activity reduced cake color [50]. These results are in coincidence and confirmed with that obtained by [64].

Table 6: Influence of basil leaves juice addition on color characteristics of cake crust samples.

Samples	*L*	*a*	*b*
Control	59.04	16.48	43.30
0.5%	58.93	15.98	38.35
1.0%	60.20	14.73	37.00
1.5%	62.17	12.91	36.29
BHT 0.01%	60.23	15.48	43.08

Increasing the percentage of added BLJ to cake, led the values of redness (a) and Yellow (b), to be slightly decreased in all treated samples. Subjective evaluations confirmed that the cake samples contained BLJ were lighter, less red (a-values) than control samples. The results showed that the a-values (redness) decreased in the treated cakes (Table 6).

Sensory Evaluation

The results of statistical analysis of sensory evaluation of prepared mayonnaise and cake using different BLJ concentrations are presented in Tables 7,8, respectively. Table 7 showed scores of appearance, color, and consistency of control sample and other prepared mayonnaise samples were not significantly (P >0.05) affected by BLJ added at

zero time. Taste, flavor, mouth feel, and overall acceptability score values showed a preference of panelists to samples prepared with 0.0% to 1.5%, of BLJ. Mayonnaise samples showed not significantly differences affected the appearance or color of all studied samples. At the same time, no significant differences in taste, flavor, mouth feel, and overall acceptability were observed between the samples prepared using 1.0% and 1.5% BLJ samples at zero time. Generally, mayonnaise samples prepared using 1.0% and 1.5% BLJ gave not significantly ($P < 0.05$) the highest overall acceptability scores at zero time compared to those of the control.

Table 7: Sensory evaluation of mayonnaise samples prepared by addition of basil leaves juice concentrations.

Samples	*Appearance*	*Color*	*Taste*	*Flavor*	*Consistency*	*Mouth feel*	*General acceptance*
).01% BHT addition.	9.2^{a}	9.0^{a}	9.2^{a}	9.0^{a}	8.8^{a}	9.0^{a}	9.0^{a}
).0% (BLJ).	9.1^{a}	9.1^{a}	9.2^{a}	9.1^{a}	8.9^{a}	9.0^{a}	9.1^{a}
).5% (BLJ).	9.2^{a}	9.2^{a}	9.0^{ab}	9.3^{ab}	9.0^{a}	9.1^{a}	9.1^{a}
1.0% (BLJ).	9.3^{a}	9.4^{a}	9.0^{ab}	9.4^{b}	9.0^{a}	9.1^{a}	9.2^{ab}
1.5% (BLJ).	9.3^{a}	9.5^{a}	8.9^{b}	9.4^{b}	9.0^{a}	9.1^{a}	9.2^{ab}
LSD	0.3	0.5	0.21	0.28	0.32	0.33	0.21

Means in the same column with different small letters are not significantly different ($P < 0.05$).

Table 8 showed scores of color, texture and structure of control sample and other prepared cake samples were not significantly ($P > 0.05$) affected by BLJ addition at zero time. Taste, flavor and overall acceptance score values showed a preference of panelists to samples prepared with 0.0% to 1.5%, of BLJ. Cake samples showed negligible differences affected the color, texture and structure of all studied samples. At the same time, no significant differences in taste, flavor, and overall acceptability were observed between the samples prepared using 1.0% and 1.5% BLJ samples at zero time. Generally, cake samples prepared using 1.0% and 1.5% BLJ gave not significantly ($P < 0.05$) the highest overall acceptability scores at zero time compared to those of the control.

Table 8: Sensory evaluation of cake samples prepared by addition of basil leaves juice concentrations.

Samples	*Color*	*Taste*	*Flavor*	*Texture*	*Structure*	*General acceptance*
0.01% BHT addition.	9.5^{a}	9.2^{a}	9.0^{a}	8.8^{a}	9.1^{a}	9.1^{a}
0.0% (BLJ).	9.5^{a}	9.2^{a}	9.1^{a}	8.9^{a}	9.0^{a}	9.0^{a}
0.5% (BLJ).	9.2^{ab}	9.0^{ab}	9.2^{ab}	9.0^{a}	9.1^{a}	9.1^{a}
1.0% (BLJ).	9.2^{ab}	8.5^{b}	8.8^{b}	9.0^{a}	9.1^{a}	9.2^{ab}
1.5% (BLJ).	9.1^{b}	8.2^{c}	8.0^{c}	9.0^{a}	9.1^{a}	9.2^{ab}
LSD	0.3	0.18	0.199	0.26	0.22	0.174

Means in the same column with different small letters are not significantly different ($P < 0.05$).

4. Conclusion

This work clarified that the oxidative stability of prepared mayonnaise or cake can be improved by the addition of BLJ at concentrations 1.0% and 1.5%. BLJ reduced the peroxidation process and the formation of the secondary oxidation products during storage for 12 weeks in mayonnaise or 6 weeks in cake. The mayonnaise or cake samples prepared using 1.0% and 1.5% had significantly ($P < 0.05$) the lowest peroxide and acid value values during storage period compared to the control sample. The cake color properties samples seemed to be lighter by the addition of BLJ in the range of concentrations tested. Addition of BLJ to mayonnaise or cake not significantly ($p < 0.05$) enhanced the sensory attributes depending on its concentration. The panelists preferred the 1.0% and 1.5% BLJ in mayonnaise or cake more than the control and other samples either at zero time. Based on the obtained data, it can be recommended to prepare mayonnaise or cake with using 1.0% or 1.5% BLJ.

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