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Haşhaş ezmesi çeşidinin bisküvi kalite karakteristikleri üzerine etkisi

Effects of ground poppy seed type on quality characteristics of biscuit

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ÖZET

Bu çalışmanın amacı, haşhaş tohumu ezmesi çeşidinin bisküvi kalite karakteristikleri ve renk değerleri üzerine etkisinin araştırılmasıdır. Afyonda üretilen beyaz haşhaş tohumu ezmesi, sarı haşhaş tohumu ezmesi ve gri haşhaş tohumu ezmesi bu çalışmada kullanılmıştır. Haşhaş tohumu ezmesi (beyaz, sarı, gri), bisküvi formülasyonuna %10 oranında katılmıştır. Haşhaş tohumu ezmesi (beyaz, sarı, gri) içeren bisküvilerin kalite karakteristikleri (ağırlık, çap, kalınlık, yayılma oranı) ve renk değerleri (L*, a*, b*) belirlenmiş ve haşhaş tohumu ezmesi içermeyen bisküvinin kalite karakteristikleri ve renk değerleri ile kıyaslanmıştır. Haşhaş tohumu ezmesi içeren bisküvilerin ağırlığı, çapı ve yayılma oranı, istatistiksel olarak haşhaş tohumu ezmesi içermeyen bisküvinin ağırlık, çapı ve yayılma oranından yüksek bulunmuştur. Haşhaş tohumu ezmesi içermeyen bisküvi, haşhaş tohumu ezmesi içeren bisküviler ile istatistiksel olarak benzer kalınlık değerine sahiptir. Beyaz haşhaş tohumu ezmesi, bisküvinin parlaklığında artışa neden olmuştur. Sarı haşhaş tohumu ezmesi içeren bisküvinin kırmızılık değeri, istatistiksel olarak haşhaş tohumu ezmesi içermeyen bisküvinin kırmızılık değerine benzer bulunmuştur. Haşhaş tohumu ezmesi içermeyen bisküvinin sarılık değeri, beyaz haşhaş tohumu ezmesi veya sarı haşhaş tohumu ezmesi içeren bisküvilerin sarılık değerinden istatistiksel olarak farklı değildir. Yüksek yayılma oranı ve haşhaş tohumu ezmesi içermeyen bisküviye benzer renk değerlerinden dolayı sarı haşhaş tohumu ezmesi içeren bisküvinin en iyi kalitede olduğu belirlenmiştir.

Anahtar kelimeler: Haşhaş tohumu, bisküvi, kalite

ABSTRACT

The objective of this study is to investigate the effects of types of ground poppy seed on quality characteristics and color values of biscuit. Ground white poppy seed, ground yellow poppy seed and ground gray poppy seed produced in Afyon, were used in this study. Ground poppy seed (white, yellow or gray) was added to biscuit formulation at the level of 10%. Quality characteristics (weight, diameter, thickness, spread ratio) and color values (L*, a*, b*) of biscuits including ground poppy seed (white, yellow, gray) were determined and compared with those of biscuit not including ground poppy seed. Weight, diameter and spread ratio of biscuits including ground poppy seed were significantly higher than those of biscuit not including ground poppy seed. Biscuit not including ground poppy seed had statistically similar thickness with biscuits including ground poppy seed. Ground white poppy seed caused an increase in lightness of biscuit. Redness of biscuit including ground yellow poppy seed was statistically similar to that of biscuit not including ground poppy seed. Yellowness of biscuit not including ground poppy seed was not statistically different from that of biscuit including ground white poppy seed or ground yellow poppy seed. Biscuit including ground yellow poppy seed had the best quality due to having high spread ratio and similar color values to biscuit not including ground poppy seed.

Keywords: Poppy seed, biscuit, quality

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1.Introduction

Poppy (*Papaver somniferum L.)* is cultivated as an annual crop in China, India and Turkey [1]. Poppy seed has medicinal properties [2]. Poppy seed has important fatty acids especially linoleic acid which provides a decrease in cholesterol [3]. Nergiz and Otleş [4] reported that poppy seed is a good source of linoleic acid. Most abundant fatty acids in poppy seeds are linoleic acid, oleic acid and palmitic acid [5]. Rahimi et al. [6] reported high variability in fatty acid levels of 18 Turkish poppy varieties. Lančaričová et al. [7] investigated fatty acids composition of 15 poppy seeds cultivated in two locations of Slovakia and reported that linoleic acid level of Redy poppy seed was the highest (74.3% and 71.6%). Sethi et al. [8] reported that genotype and location affected oil content of poppy seed. Ryan et al. [9] reported that poppy seed had palmitic acid, palmitoleic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, arachidic acid, gadoleic acid and erulic acid at the level of 12.20%, 0.27%, 2.30%, 22.19%, 59.87%, 1.30%, 0.67%, 0.16% and 0.29%, respectively. Ozcan and Atalay [1] investigated fatty acids, minerals and tocopherols of poppy seed oils and reported that poppy seed oils had palmitic acid, stearic acid, oleic acid, linoleic acid and linolenic acid and high amount of phosphorous, potassium, calcium, magnessium and sodium and α-tocopherol, β-tocopherol and δ-tocopherol in the range of 26.8-37.2ppm, 309.5-567.3ppm and 6.1-18.6ppm, respectively.

According to Vasak [10], difference in the colors of poppy seed was related with the anatomical structure of the outer layers. Maden and Yalcin [11] investigated the effects of storage of 3 type poppy seed (white, yellow, gray) oils at 15-20°C for 0, 7, 15, 30, 45 and 60 days on free acidity, peroxide value, iodide number and color values (L*, a*, b*) and reported that stabilities of these different poppy seed oils were high and L* and b* color values of white and gray poppy seed oil increased, while a* color value decreased and L* and a* color values of yellow poppy seed oil increased, whereas b* color value decreased with increasing of storage time. It was also reported that oil contents of poppy seeds (white, yellow, gray) were 53.85%, 49.85% and 49.17%, respectively. Yalcin and Maden [12] used ground yellow poppy seed in noodle formulation at the levels of 5% and 10% for increasing of total phenolic content of noodle. It was reported that total phenolic content of noodles increased and the color of noodles became darker, when ground yellow poppy seed level increased. Yalcin [13] replaced fat with ground yellow poppy seed in biscuit formulation and reported that fat replacement caused an increase in spread ratio of biscuit and lower L* color value and higher a* and b* color value. Total phenolic content of biscuits increased gradually as ground yellow poppy seed level in fat increased from 0% to 100%.

Fat is important ingredient in biscuit and provides the good quality [14]. Manohar and Rao [15] reported that hydrogenenated fat caused an increase in thickness of biscuit compared to shortening. According to Mamat and Hill [16], fat and sugar play the structuring role in biscuit. Omran et al. [17] investigated the effect of flaxseed flour on quality characteristics of biscuit. Addition level of flaxseed flour to biscuit formulation was 25%, 50% and 75%. It was reported that diameter and thickness of biscuits increased with increasing level of flaxseed flour while spread ratio decreased.

It was not found a study about quality characteristics of biscuits including 3 type ground poppy seed in literature. The objective of this study is to produce biscuits including ground poppy seed (white, yellow, gray) and to evaluate the quality characteristics of these biscuits.

2.Materials and Methods

2.1.Materials

Soft wheat flour, ground white poppy seed, ground yellow poppy seed, ground gray poppy seed and biscuit ingredients (Sugar, skimmed milk powder, corn syrup with high fructose, shortening, salt, sodium bicarbonate, ammonium bicarbonate) were purchased from market in Afyon.

2.2. Analysis of ground poppy seeds

Oil amount of all ground poppy seeds was determined according to the method of AOAC[18] .

2.3. Biscuit production

Biscuits were prepared according to the method of AACC [19] with slight modifications. Wheat flour and ground poppy seed (white, yellow, gray) were mixed in ratio of 90:10 for the preparation of biscuits. Wheat flour was used for the preparation of control wheat biscuit. Wheat flour, ground poppy seed and biscuit ingredients were mixed in a laboratory dough mixer (Essenso Professeur 216912, China). After mixing, the dough was taken and sheeted to a thickness of 6.9 mm. The dough was cut into circular shape using 59.5 mm diameter cutter on aluminum baking tray. Biscuit dough was baked at 200°C for 11 min. The baked biscuits were cooled to room temperature before analysis .

2.4. Analysis of biscuits

2.4.1.Weight and geometry of biscuits

Weight of biscuits was measured by using weighing balance (HR-250 AZ, South Korea) According to the AACC standard method (AACC, 2000). Diameter and thickness of biscuits were measured by using caliper (Soma -2950). Spread ratio of biscuits was calculated by dividing diameter by thickness.

2.4.2. Color values (L*, a*, b*) of biscuits

The color measurement (L*, a*, b*) of ground biscuits was carried out in duplicate using the L*a*b* color system, where L* is lightness, a* is redness, and b* is yellowness. The instrument used was a X-rite Ci6x portable spectrophotometer (USA).

2.3.3. Statistical analysis

Data related to weight, biscuit geometry and color properties of the biscuits were statistically evaluated by one-way analysis of variance procedure and Duncan test was used to establish the significance of differences among the mean values at the 0.05 significance level.

3.Results and Discussion

3.1. Oil amount of ground poppy seeds

Ground white poppy seed, yellow poppy seed and gray poppy seed had 51.7%, 50.9% and 49.3% oil content, respectively.

3.2.Weight and geometry of biscuits

Weight value of biscuits is given in Table 1. Weight value of biscuits including ground poppy seed ranged from 8.92g to 9.08g. Weight value of biscuits including ground poppy seed was significantly higher than that of biscuit not including ground poppy seed. Biscuit including ground white poppy seed had statistically similar weight value to biscuits including ground yellow poppy seed or ground gray poppy seed. Similar result was reported by Yalcin [13]. In this study, biscuits containing ground yellow poppy seed (50%, 75%, 100% of shortening) had higher weights compared to control biscuit.

Diameter of biscuits is given in Table 1. Diameter of biscuits including ground poppy seed ranged from 5.49cm to 5.57cm. Ground poppy seed caused an increase in diameter of biscuits. There was no statistically difference among diameters of biscuits including ground poppy seeds. Similar result was obtained by Yalcin [13]. According to the study reported by Yalcin [13], biscuits containing ground yellow poppy seed as fat replacer (75%, 100%) had higher diameter compared to control biscuit.

Thickness of biscuits is given in Table 1. Thickness of biscuits including ground poppy seed ranged from 0.91cm to 0.94cm. Thickness of all biscuits were statistically similar.

Spread ratio of biscuits is given in Table 1. Spread ratio of biscuits including ground poppy seed ranged from 5.93 to 5.99. Spread ratio of biscuits including ground poppy seed was higher compared to that of biscuit not including ground poppy seed, indicating better quality. Similar result was also obtained by Yalcin [13]. Yalcin [13] reported that higher spread ratio value was observed for biscuit including ground yellow poppy seed compared to biscuit not including ground yellow poppy seed. Ground poppy seed had high amount of oil. So biscuits including ground poppy seed had higher spread ratio.

Table 1. Weight, diameter, thickness and spread ratio values of biscuits[a]

Poppy seed type	Weight (g)	Diameter (cm)	Thickness (cm)	Spread ratio
None	7.25 b	5.28 b	0.91 a	5.83 b
White	8.99 a	5.50 ab	0.92 a	5.99 a
Yellow	9.08 a	5.57 a	0.94 a	5.93 a
Gray	8.92 a	5.49 ab	0.92 a	5.96 a

[a]Values followed by the same letter in the same column are not significantly different ($p<0.05$)

3.3.Color values of biscuits

Color values (L*, a*, b*) of biscuits are shown in Figure 1. L* color value (lightness) of biscuit including ground white poppy seed was significantly higher than that of other biscuits. a* color value (redness) and b* color value (yellowness) of biscuits including ground gray poppy seed was significantly lower compared to that of other biscuits. L*, a* and b* color value of biscuit including ground yellow poppy seed were similar to those of biscuit not including ground poppy seed.

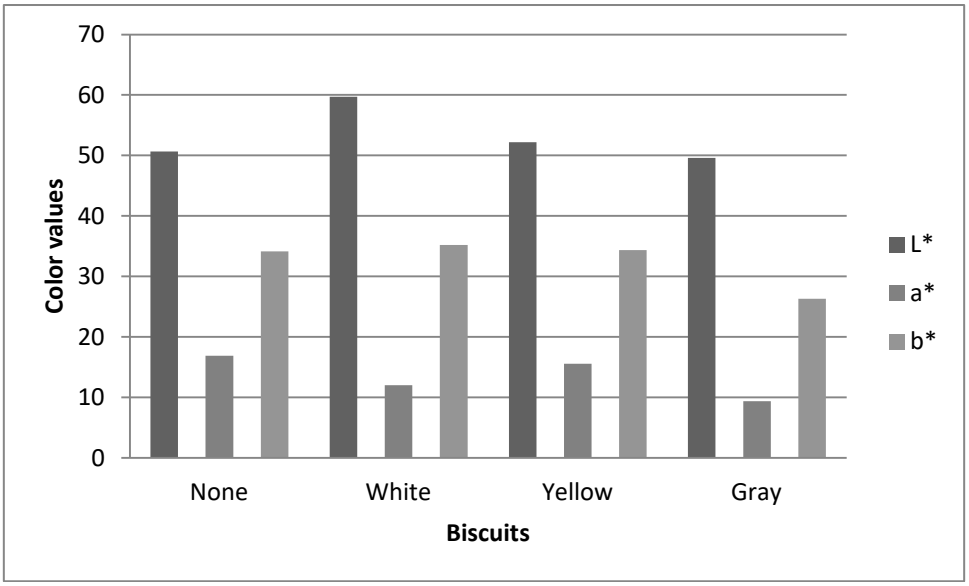

Figure 1. Color values (L*, a*, b*) of biscuits

None; biscuit not including ground poppy seed, white; biscuit including ground white poppy seed, yellow; biscuit including ground yellow poppy seed, gray; biscuit including ground gray poppy seed.

4. Conclusion

Ground poppy seed caused the increase in weight, diameter and spread ratio values of biscuits. Biscuits including ground white poppy seed had higher lightness compared to biscuit not including ground poppy seed. Redness of biscuits including ground gray poppy seed was lower than that of biscuit not including ground poppy seed. Yellowness of biscuit not including ground poppy seed was statistically similar to that of biscuit including ground white poppy seed and that of biscuit including ground yellow poppy seed. Biscuit having best quality characteristics was biscuit including ground yellow poppy seed. Because this biscuit had high spread ratio and color values of that was statistically similar to biscuit not including ground poppy seed.

References

[1] *M.M. Ozcan and C. Atalay,* Determination of seed and oil properties of some poppy (*Papaver somniferum L.*) varieties. Grasas Aceites, **57 (2)**, 169-174 *(2006).*

[2] K.Aruna and V.M. Sivaramakrishnan, Anticarcinogenic effects of some Indian plant products. Food Chemistry and Toxicology, 30:953-956 (1992).

[3] S.P. Singh, K.R. Khanna and S.Shukla, Breeding strategies in opium poppy (P. somniferum L.) at National Botanical Research Institute, Lucknow, India. Applied Botany Abstracts, 19(2), 121-139 (1999).

[4] C. Nergiz and S. Ötleş, The proximate composition and some minor constituents of poppy seeds. Journal of the Science Food and Agriculture 66, 117-120(1994).

[5] N. Azcan, B.O. Kalender and M. Kara, Investigation of Turkish poppy seeds and seed oils. Chemistry of Natural Compounds 40, 370-72(2004).

[6] A. Rahimi, M. Kiralan, M. Arslan and A. Barak, Variation in fatty acid composition of registered poppy (Papaver somniferum L.) seed in Turkey. In Akademik Gida, 9(3), 22-25(2011).

[7] A. Lančaričová, M. Havrlentová, D. Muchová and A. Bednárová, Oil content and fatty acids composition of poppy seeds cultivated in two localities of slovakia. Agriculture (Poľnohospodárstvo), 62, 19-27 (2016).

[8] L. Sethi, L. Sapra and R. Gupta, Performance of poppy cultivars in relation to seed, oil and latex yields under different environments. In Journal of the Science of Food and Agriculture, 52(3), 309-313 (2006).

[9] E. Ryan, K. Galvin, T.P. O'Connor and A.R. Maguire, Phytosterol, squalene, tocopherol content and fatty acid profile of selected seeds, grains, and legumes. Plants Food Human Nutrition 62, 85-91 (2007).

[10] J. Vašák, Mák. Praha: Powerprint, p. 336. ISBN 978-80-904011-8-1(2010).

[11] Maden, S. Yalcin. The Effect of Storage on Some Properties of 3 Different Ground Poppy Seed Fats. International Journal of Secondary Metabolite , 4(3), 349-354 (2017).

[12] S. Yalcin, B. Maden. Quality Characteristics of Noodle Including Ground Yellow Poppy Seed. International Journal of Secondary Metabolite , 4(3), 312-318 (2017).

[13] S. Yalcin,. Determination of Quality Characteristic of Biscuits Including Ground Yellow Poppy Seed as Fat Replacer. International Journal of Secondary Metabolite, 4(3), 406-411 (2017).

[14] C.M. O'Brien, D. Chapman, D.P. Neville, M.K. Keogh, E.K. Arendt, Effect of varying the microencapsulation process on the functionality of hydrogenated vegetable fat in short dough biscuits. Food Research International, 36, 215-221 (2003).

[15] S. Manohar and H. Rao, Interrelationship between rheological characteristics of dough and quality of biscuits; use elastic recovery of dough to predict biscuit quality. Food Research International, 35(9), 807-813 (2002).

[16] H. Mamat and S.E. Hill, Effect of fat types on the stuructural and textural properties of dough and semi-sweet biscuit. Journal of Food Science and Technology, 51(9), 1998-2005 (2014).

[17] A.A. Omran,, O.S. Ibrahim, Z.E.O.M. Mohamed Quality characteristics of biscuit prepared from wheat and flaxseed flour. Advances in Food Science, 38(4), 129-138 (2016).

[18] AOAC (1990). Official Method of Analysis. 15 th edn. Association of official analytical chemists, Washington, DC.

[19] AACC (2000). Approved methods of the American Association of Cereal Chemists (10th ed.) St. Paul, MN, USA. American Association of Cereal Chemists.