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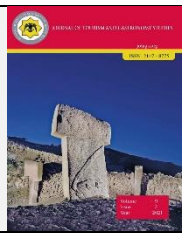

Use of Ahlat Flour in Cookie Production

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Abstract

The physical and chemical properties of the cookies produced can be changed by the amount and mixtures of flour added. Especially because one out of every hundred people in Turkey suffer from celiac disease, gluten-free products has increased interest in food preferences. For this purpose, in the study, by reducing the addition of gluten-free flour, cookies were made with Ahlat flour (AF) (5%, 10% and 20%). Sensory analysis of cookies was carried out by trained panelists in 2019. According to the results of the study, 20% AF products were appreciated more than the control in terms of general taste, odor and appearance. It is thought that the new product produced will be suitable for use in Celiac patients.

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INTRODUCTION

The use of Ahlat (*Pyrus elaeagnifolia*) is a common fruit dating back to ancient times. Its emergence is known as Anatolia, Caucasus and Central Asia. Although there are more than 600 varieties of Ahlat produced in every region every season, it is said that important gene resources are in Turkey (Davis, 1972; Layne & Quamme, 1975; Westwood, 1978; Ozbek, 1978; Ozçağıran, Unal, Ozeker & Isfendiyaroğlu, 2004). Although the increase in the use of functional food in nutrition increases the interest in fruits, trying to select good and productive species in agriculture causes the extinction of wild fruit species. Ahlat (*Pyrus elaeagnifolia Pall*., Coniferous pear) consumed as a traditional fruit is also included in this group (Yılmaz et al., 2015).

Many civilizations used Ahlat in their culinary cultures and kept food and beverages made of it at their tables. Table 1 shows the civilizations that produced the Ahlat and products (pickles, jams, compote) according to literature. During the Ottoman period, fruits were consumed as a snack. It is also used in the fields of dessert and confectionery in halva shops (Asif, 2011). The most fruit pickles in the 15th century; It is known as apple pickle, pomegranate pickle, plum pickle, grape pickle, quince pickle, pear pickle and cherry pickles (Közleme, 2012; Ozaydın & Ozçelik, 2014). Again made from fresh fruits; There are jam types such as watermelon, quince, cranberry, pear, peach and cherry (Izli, 2018). Ahlat is widely consumed in Turkey as fresh, canned, dried and flour (Baltas, 2017). The Ahlat collected in September-October are dried by sun drying method. The dried Ahlat are ground in the mill and turned into flour (Bağcı, 2016). Dried pear; They are involved in the production of sauces and compotes. In the production of bakery products, dried Ahlat are used in flour with the help of grinders (Asif, 2011).

Table 1. Civilizations Consumption of Wild Pear and Pear Products

Civilizations	**Source**
Hittites	(Uhri, 2015; Cetinkaya, 2018; Işın, 2018)
Mesopotamia	(Doğdubay, 2015; Işın, 2018)
Ancient rome	(Uhri, 2015; Cetinkaya, 2018; Sürücüoğlu &Ozçelik, 2019)
Central Asian Turkish State	(Samancı, 2008; Yerasimos, 2014; Cetinkaya, 2018; Işın, 2018)
Anatolian Seljuk State	(Samancı, 2008; Yerasimos, 2014; Samancı, 2016; Işın, 2018)
14th and 15th century Ottoman Empire	(Michalska, Wojdylo, Lech, Lysiak & Figiel, 2016; Işın, 2018; Izli, 2018; Sürücüoğlu & Ozçelik, 2019)
16th and 17th century Ottoman Empire	(Işın, 2018; Sürücüoğlu & Ozçelik, 2019)
18th and 19th century Ottoman Empire	(Asif, 2011; Közleme, 2012; Ozaydın & Ozçelik, 2014)

The most common acid in pear fruit is malic acid; There are also volatile compounds such as esters, alcohols, hydrocarbons, aldehydes and ketones (Thompson, 2000). It is stated that dried pear has a bitter taste due to phenolic and polyphenolic substances (Güneş, Biçer Bayram & Erçetin, 2019). Pear consumption slowly and steadily raises blood sugar; Therefore, it is said to be a suitable food for diabetics, the elderly and infants (Estévez, Fontanot, Pak & Sáenz, 2000). Dried pears are generally used in the food industry for making bakery products, jams, compote and sauces (Amiripour, 2015). It is known that pear fruit has a low glycemic index together with its high dietary fiber feature (Aydın, 2008). Ahlat fruit has rich content in terms of carotene, tannin, sugar, fruit acid, pectin and vitamin B, vitamin C (Cakılcıoğlu, Şengün & Türkoğlu, 2010; Güdücü, 2014; Baltas, 2017; Murathan, Erbil, Düzgüner & Arslan, 2019).

Preliminary analyzes are required for new products produced in the food industry to be accepted by consumers. Sensory analysis is used as a method that aims to influence consumer behavior and raise awareness by using different sensory strategies for new products. Analyzes conducted for this purpose provide a preliminary measure of how products will be met in the market (Aydın, 2008; Hultén, Broweus & Van Dijk, 2009).

Today's technological opportunities increase the interest in gluten-free bakery products in the special food category. These products are naturally prepared from gluten-free products such as rice, corn and soy flour (Kabas, Ozmerzi & Akıncı, 2006). However, these products produced from refined flour or starch become poorer than other foods in terms of some B group vitamins, iron and dietary fiber content (Zanoelo, Cardozo-Fılho & Cardozo-Júnıor, 2009).

Celiac disease and diabetes requiring special nutrition, nutritional allergies and diseases related to the digestive system constitute an important area in the world. The range of products sold in the market for the consumption of people with these characteristics develops with technology. Combining the nutritional content of Ahlat with bakery products offers a different and unique product to the consumer (Figure 1). In addition, Ahlat is used in Turkish cuisine among the fruits that are sweetened according to the season. While preparing fruit desserts, if they are kept in the open after peeling the skin, darkening occurs due to oxidation. Therefore, after peeling the shell part, lemon should be applied on it or soaked in water. If you want to make use of the Ahlat fruit as a whole, it should be peeled properly without spoiling its shape and cooked over low heat. In the study, dried Ahlat flour was used in the production of cookies, its nutritional content was enriched and its feature of being a new product in bakery was tested. Although gluten-free products have high nutritional properties (Yağcı & Doğan, 2016), taste factors leave an unpleasant effect for individuals with special nutritional needs. In order to reduce this effect, cookies were produced with the addition of locally used Ahlat flour.

Figure 1: a. Pudding with pear sauce, **b.** dried pear colored with food coloring, **c.** pear chocolate, **d.** pear cake, **e.** pear crumble bar

Material and Method

Ahlat flour (AF) was commercially available to prepare cookies in 2019 (September-October). AF, Pyrus eleagnifolia fruit grown around Karaman Sarıveliler was obtained from pears that were dried and ground in a stone mill. The supply of flour was provided by the local people. Ahlat (*Pyrus elaeagnifolia*) is washed without peeling the fruit. 1 kg (10 minutes) is pressed for 10 days in autumn and dried for 1 week in natural stone.

The control group was produced by using 225 g of gluten-free flour, 200 g of vegetable oil, 100 g of powdered sugar and 1 egg for cookies. The dough was prepared by forming three samples at the rates of 5%, 10% and 20% using AF. According to this rate, the amount of gluten-free flour has been reduced. The cookies were baked in a conventional oven (Fimak, Konya) at 160˚C for 20 minutes. Approximately 1 hour later, the panelists tasted the cookies. Panelists for sensory evaluation of cookies: A total of 12 trained between the ages of 20-55 (Necmettin

Erbakan University Faculty of Tourism Gastronomy Department of taste Sensory Analysis lesson, odor analysis have received training) students and Necmettin Erbakan University Faculty of Tourism Gastronomy Department (Konya, Turkey) 9 education It consists of elements. The samples were asked to be evaluated in terms of color, appearance, taste, odor, hardness, and general taste with a hedonic scale of 5 (5-I like it, 4-I like it, 3-I like it, I don't like it, 1-I don't like it at all). The tasting of the cookies was inspected for the panelists in 2 repetitions and in two parallel (14.10.2019-31.10.2019). For statistical analysis, the means of the data were compared with the control using a statistical package program (ANOVA, Tukey; $p < 0.05$).

Results and Discussion

When flour and bakery product production is made in line with the needs and demands of consumers, sectoral needs can be met. For example, initiatives were initiated by the Ministry of Health in Turkey in 2019 to control metabolic diseases that require special nutrition. In initiatives started for this purpose, it has been tried to increase the access to suitable products by cooperating with various companies and universities (Cölyak Rehberi, 2019). There is a tendency towards special flour production in line with the needs (Azabağaoğlu & Demirarslan, 2012). At the same time, among the grain-based products found in special diets, gluten-free bread and cookies are among the most demanded products worldwide (Jnawali et al., 2016).

To the cookie dough; Oat flakes, cactus pear flour, almond flour, mulberry flour, spindle flour, pumpkin flour, buckwheat flour (Estévez et al., 2000; Hayit & Gül, 2015; Ozkaya, Durlu, Akbulut & Tulga 2017; Aydın, 2020), wheat germ can be added. Thus, the nutritional value of new products is increased. In foods prepared by drying; vitamin, mineral and antioxidant components are preserved. Its texture and aroma properties have improved and nutritional values have increased (Nawirska, Figiel, Kucharska, Sokół-Łętowska & Biesiada, 2009; Ismail, Akthar, Riaz & Ismail, 2014; Ergün, Çalışkan & Dirim, 2016;; Kumari, Sindhu, Rani & Kumari, 2021; Krivokapić, Vlaović, Damjanović Vratnica, Perović & Perović, 2021; Ning, Wu, Luo, Chen, Mo, Luo & Wang, 2021, Sielicka-Różyńska, Jerzyk & Gluza 2021). In this study, in which the use of dried fruits in nutrition and new products with improved taste properties for individuals with special nutrition were investigated, the amount of flour in the cookies made using AF was reduced. Since the dough consistency was not dense, an increase was observed in the cooking time and the amount of stickiness in shaping (Figure 2). Similarly, it is known to have a negative effect in terms of cooking time in the production of gluten-free pasta and noodles (Yalçın & Başman 2006; Ozuğur & Hayta 2011; Demir & Bilgiçli 2018).

Figure 2. a. Control group, **b.** 5% Ahlat flour added cookies, **c.** 10% Ahlat flour added cookies,, **d.** 20% Ahlat flour added cookies,

Table2. Statistical information in the first and second repetitions according to sensory analysis data

		Mean ± S.H.	F (df 7)	Sig.	T Test
Color	Control	3.74±0.48			
	5%	3.50±0.29	0.70	0.43*	31.18
	10%	3.53±0.21			
	20%	3.18±0.14			
Appearance	Control	3.48±0.91			
	5%	3.22±0.21	1.42	0.27*	22.02
	10%	3.79±0.56			
	20%	3.27±0.26			
Taste	Control	3.23±0.26			
	5%	3.23±0.26	0.70	0.43*	23.17
	10%	3.81±0.32			
	20%	2.97±0.36			
Smell	Control	2.64±0.20			
	5%	3.66±0.47	0.10	0.75	15.92
	10%	3.03±0.40			
	20%	2.58±0.23			
Hardness	Control	3.12±0.70			
	5%	2.85±0.44	0.92	0.37*	31.70
	10%	3.39±0.01			
	20%	2.96±0.00			
General taste	Control	3.25±0.29			
	5%	3.21±0.53	0.007	0.93	30.51
	10%	3.52±0.06			
	20%	3.08±0.23			

Severity levels: * p <0.05; Control, 5% Ahlat flour added cookies, 10% Ahlat flour added cookies, 20% Ahlat flour added cookies.

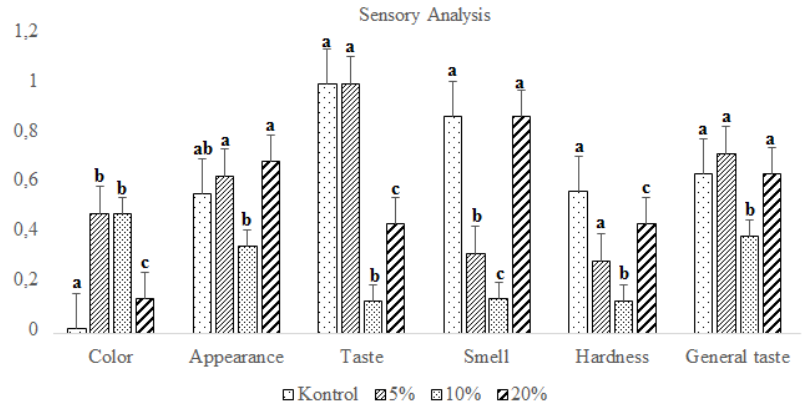

Figure 3. Sensory analysis results (Least Significant Difference; LSD, p <0.05); Control, 5% Ahlat flour added, 10% Ahlat flour added cookies, 20% Ahlat flour added cookies.

When the AF color factor produced in the study is evaluated, an increased darkening is observed and there is no difference in color between the cookies with 5% and 10% additive. It is known in studies that gluten-free products have a weak color (Ozuğur & Hayta, 2011). In this study, it was determined that the color defect can be eliminated after baking with the Ahlat additive used. Similarly, the studies showing that the color properties of breads with chickpea flour are improved (Barışık & Tavman, 2018). Although there was a difference in the colors of the cookies with Ahlat flour (5% and 20%), the appearance characteristics were similar, and although the odor-added cookies smell pleasant, the greatest difference between the groups was not observed in the 10% group. While the scents of some products such as chia used in cake production are considered pleasant by panelists (Ozkaya & Durlu, 2017;

Mutlu, Tontul, Candal & Erbaş 2019), the product odor may change positively or negatively depending on the additive used (Alparslan, 2005; Susamcı, Otleş & Irmak, 2011; Oğur, 2015). In the study, although 5% AF's were liked more in terms of taste, it was determined that the increased amount of AF positively affected the hardness ($p < 0.05$; Table 1). It is stated that bakery products prepared with buckwheat decrease in volume and create negativity in hardness (Hayit & Gül, 2015). It has been observed that if an average of 70 grams of starch is used in cookies made as an alternative to healthy eating, the amount of hardness will decrease. The high taste of products developed by adding different ingredients such as coffee and vanilla to cookies is similar to our study (Ustaahmetoğlu, 2016; Eğe, Akan, Oktar, Kalkandelen & Gündüz, 2017). In this study, although it was stated that 5% AF cookies were liked more in general taste, there was no statistically significant difference (Table 2, Figure 2). It has been stated that the general taste of cookies with added ascorbic acid and wheat germ is similar (Avcıoğlu, 2014). In addition, it was stated that the panelists gave the highest score to the samples with the addition of 25% of the cookies made with stale bread (normal, sourdough and whole wheat) (Karaoğlu, 2018).

It is used as the main and indispensable raw material of flour in bread, cake, pastries, biscuits, crackers, cookies and pastries, especially in bakery products. (Tebben, Shen & Li, 2018; Xu, Wang & Li, 2018; Coronel, Guiotto, Aspiroz, Tomás, Nolasco & Capitani, 2021). Dried fruits and fruit powders are used to increase the efficiency and sensory evaluation of these products. In the quality of the dried fruits used; It is stated in studies that the heat treatment applied, storage and many other processes have an effect in the quality of the dried fruits used (Sakaldaş, 2014; Eroğul, Oğuz & Sen, 2016; Akbal & Vural, 2018). In addition, the amount of water-soluble dry matter is one of the important parameters that determine the taste of fruits. Therefore, the dry matter and water soluble dry matter ratios on the product obtained are considered among the important productivity criteria in processing the product (Ozaydın & Ozçelik, 2014). In a study it is stated that there is no risk as a result of the microbiological analysis that evaluates the risk factors that may occur by applying the drying process on the Ahlat fruit. No coliform bacteria were detected in Portuguese pear varieties and dried pears (Barroca, Guiné, Pinto, Gonçalves & Ferreira, 2006). It is necessary to take measures to prevent mold formation during harvest, drying conditions and storage, since toxin formation may be observed in products with high water activity value (for example, grapes) (Seçkin & Taşeri, 2015). In a study where product quality parameters were evaluated together with risk factors, marmalade was made using Ahlat pear. As a result of the sensory evaluation after the drying process applied to Fujiwara pear; appearance, taste and texture evaluations were found to be appreciated by consumers. Therefore, the fact that dried pear is an efficient nutrient in terms of color, texture and nutritional value is similar to the general taste responses given to the cookies in our study. In addition, it is stated that the simple production process developed in the study can be easily adapted to the food industry (Fujiwara, 2014). In this context, AF cookies used in the study are thought to contribute to this field. Many products made with pears specific to the regions are encountered due to the richness of Turkish cuisine culture. It is consumed by making different pear varieties, compote and molasses (pear molasses) (Carranza-Concha, Benlloch, Camacho & Martínez-Navarrete, 2012). It has been determined that the use of apple pulp as an additive in bread making especially increases the fiber ratio of bread. When all analyzes were evaluated collectively in the study, bread with 5% apple pulp powder was found to be sensory acceptable. However, they stated that 10% apple pulp-added bread can be consumed, in which the nutritional properties coming from apple pulp are more prominent (Erdoğan, 2010). In another efficiency enhancement study, it was tried to add functionality to the snack food by adding fish oil (rich in omega-3 fatty acids) mixtures microencapsulated with maltodextrin to the cookie dough using a spray dryer.

As a result of the study, it was concluded that encapsulation significantly reduced lipid oxidation in the product (Chouksey & Venkateshwarlu, 2016). In a study investigating the in vitro bioavailability of gallic acid, ellagic acid and ellaji tannins in cookies with pomegranate peels added, it is stated that the bioavailability of gallic acid in cookies is 52% higher than the bioavailability of gallic acid in pomegranate peels alone (Colantuono, Ferracane & Vitaglione, 2016). A different method of nutritionally fortifying cookies is using legumes such as oats and bean flour. It is stated that the diabetic rats fed with this new product for two months have a decrease in serum glucose level, serum triglyceride level and serum LDL level compared to the control group. The reason for this decrease is thought to be related to the content of dietary fiber, galacto-oligosaccharides, chlorogenic acid, rutin, protocatechic acid, cytosterol and soyacaponin in oat and bean flour (Berlinet, Brat, Brillouet & Ducruet, 2006). In the study where whey concentrate (PSK) was used in biscuit production, it was aimed to reduce the fat and sugar ratio in the final product by using 70% PSK in the flour mixture and polydextrose and maltitol as sweetener. At the end of the study, the biscuits that were positive in terms of senses and reduced energy by 15.98% were obtained (Aggarwal, Sabikhi & Kumar, 2016).

In a study investigating the possibilities of enriching biscuits, one of the bakery products, with cassava (ManihotesculentaCrantz) and soybean flour, it was observed that the protein and fat content of the biscuits increased as the rate of soy flour in the formulation increased (Ugwuona, 2009). It was determined that the protein content of biscuits produced using 20% skim mustard flour increased approximately 2.5 times compared to wheat flour. It is stated that while the ash and fiber content of the biscuits increases with the increase in the ratio of mustard flour, the oil content decreases. As a result of the study, the usage rate was determined as 15% because it shows significant changes in the case of using more than 15% in terms of textural and sensory features (Tyagi, Manikantan, Oberoi & Kaur, 2007). While Washington orange peel and tangerine peel were powdered and added separately to the Marie-type (hard) biscuit formulation in determined proportions, the amount of crude fiber and ash in the biscuits increased with the increase of the ratios; It has been stated that there is a decrease in carbohydrate and protein content. In addition, an increase in the shelf life of the biscuits was observed with the inhibition of lipid oxidation of orange peel and tangerine peel powder. According to the results of the sensory analysis, it was suggested that this rate should not be exceeded in practice due to the negative effects occurring by increasing the rates above 10% (Magda, Awad & Selim, 2008). According to the sensory analysis results in a study in which black currant, a source of dietary fiber and antioxidants, was added to the gluten-free chocolate cookie formulation, it could be accepted at a high level among consumers with and without celiac disease (Gagneten, Archaina, Salas, Leiva, Salvatori & Schebor, 2021). Extracts obtained from Gooseberry (*Emblicaofficianalis*), Moringa tree (*Moringa oleifera*) leaves and grape (*Vitisvinifera*), which can be used as natural antioxidants, were added to the biscuit formulation. As a result of the sensory analysis, the general acceptability of the biscuits where the extracts obtained from the leaves of Gooseberry and Moringa tree were used during the storage period did not change; it was determined that biscuits using grape extract were unacceptable in the 6th week and using the selected vegetable sources at the rates of 1% and 2% as used in the study was acceptable in terms of the structure of the biscuit (Reddy, Urooj & Kumar, 2005). In addition, they found that the protein content of the biscuits in which cashew flour was used was much higher than the group in which cashew apple flour was used and the control group. However, it was observed that the sensory properties of the biscuits increased in proportion to the increase in the addition of castor flour added to the biscuit (Uchoa, Correia da Costa, Maia, Meira, Sousa & Brasil, 2009).

Scientific studies reveal the use of ingredients of foods such as biscuits, cakes, cookies, which are widely consumed due to their functional properties, and their positive effects on health (Jan, Panesar & Singh, 2018; Değerli & El, 2019; Gocmen, 2019; Aksoylu, Cağındı & Köse, 2012).

Conclusion and Recommendations

In this study conducted with the aim of developing a healthy new alternative snacks for individuals with special nutritional needs by reducing the use of flour and its derivatives for gluten-free products that are expensive for the consumer; In cookies made using AF and gluten-free flour, the rate of additive was used as 20% because the stickiness rate increases as the amount of Ahlat flour increases. While the use of 5% AF in cookies improves the taste and color characteristics, it has been determined that the odor decreases in those with 20% AF, and the highest and lowest AFs cause changes in appearance and general taste. It is thought that cookies created with the addition of AF can be an alternative product if a completely gluten-free flour or starch addition is used. It was determined by the study that it is possible to use pear flour in sweet products such as cakes. Future studies can be planned accordingly.

Declaration

The contribution of all authors of the article to the article process is equal. There is no conflict of interest to be declared by the authors.

REFERENCES

Aggarwal, D., Sabikhi, L., & Kumar, M.S. (2016). Formulation of Reduced-calorie biscuits using artificial sweeteners and fat replacer with dairy–multigrain approach. *NFS Journal*, 2, 1-7.

Akbal, N., &Vural, A. (2018). Kurutulmuş meyve örneklerinde mikrobiyolojik kalite özelliklerinin araştırılması. *Dicle Universitesi Veteriner Fakültesi Dergisi*, 11(2), 93-97.

Aksoylu, Z., Cağındı, O., & Köse, E. (2012). Bisküvinin fonksiyonel bileşenlerce zenginleştirilmesi. *Academicfoodjournal/akademik GIDA*, 10, 3.

Alparslan, G. (2005). *Etlik piliçlerin performans ve bazı kan parametre değerleri üzerine farklı düzeylerde balık yağı içeren yemlerin etkisi* (Yüksek Lisans Tezi). Adnan Menderes Universitesi, Fen Bilimleri Enstitüsü, Aydın.

Amiripour, M., Habibi-Najafi, M.B., Mohebbi, B., & Emadi, B. (2015). Optimization of Osmo-Vacuumdrying of Pear (Pyruscommunis L.) Using Response Surface Methodology. *Journal of Food Measurement and Characterization*, 9(3), 269-280. doi: 10.1007/s11694-015-9232-9

Asif, M. (2011). The role of fruits, vegetables, and spices ın diabetes. *International Journal of Nutrition Pharmacology Neurological Diseases*, 1(1), 27-35.

Avcıoğlu, G. (2014). *Buğday Rüşeymli kurabiyelerin bazı kalitatif özelliklerinin ve raf ömrünün belirlenmesi üzerine bir araştırma* (Doktora Tezi). Selçuk Universitesi, Fen Bilimleri Enstitüsü, Konya.

Aydın, E. (2020). Unlu mamullerin kompozit unlar ile zenginleştirilmesi. *Akademik Gıda*, 18(2), 217-227.

Aydın, M. (2008). Ordu ve yöresi ağızlarında armut adları. *Turkish Studies International Periodical Forthe*

Languages, Literature and History of Turkishor Turkic, 3(3), 129-138.

Azabağaoğlu, O., & Demirarslan, V. (2012). Türkiyedeki un ve unlu mamul işletmelerinin pazarlama yönetimleri açısından incelenmesi: Edirne ili örneği. *Balkan Sosyal Bilimler Dergisi*, 1(2), 1-14.

Bağcı, Y. (2016). Sarıveliler (Karaman) ve çevresinde yetişen bitkilerin etnobotanik özellikleri. *Selçuk Universitesi Fen Fakültesi Fen Dergisi*, 42(1), 84-107.

Baltas, N. (2017). Investigation of a wild pear species (Pyrus Elaeagnifolia Subsp. Elaeagnifolia Pallas) from Antalya, Turkey: Polyphenol oxidase properties and anti-xanthine oxidase, anti-urease, and antioxidant activity. *International Journal of Food Properties*, 20(3), 585-595.

Barışık, D., & Tavman, Ş. (2018). Glütensiz ekmek formülasyonlarında nohut unu kullanımının ekmeğin kalitesi üzerine etkisi. *Akademik Gıda*, 16(1), 33-41.

Barroca, M.J., Guiné, R.P.F., Pinto, A., Gonçalves, F.M., & Ferreira, D.M.S. (2006). Chemical and microbiological characterization of Portuguese varieties of pears. *Food and Bioproducts Processing*, 84(2), 109-113.

Berlinet, C., Brat, P., Brillouet, J. M., & Ducruet, V. (2006). Ascorbic acid, aroma compounds and browning of orange juices related to PET packaging materials and pH. *Journal of the Science of Food and Agriculture*, 86(13), 2206-2212.

Cakılcıoğlu, U., Şengün, M.T., & Türkoğlu, D. (2010). An ethnobotanical survey of medicinal plants of Yazıkonak and Yurtbaşı Districts of Elazığ province, Turkey. *Journal of Medicinal Plants Research*, 4(7), 567-572.

Carranza-Concha, J., Benlloch, M., Camacho, M.M., & Martínez-Navarrete, N. (2012). Effects of drying and pretreatment on the nutritional and functional quality of raisins. *Food Bioprod Process*, 90(2), 243-248.

Cetinkaya, N. (2018). Gastronominin tarihsel gelişimi. Içinde: A. Akbaba ve N. Çetinkaya (Ed.), *Gastronomi ve yiyecek tarihi*, Detay Yayıncılık, ss. 1-588. Ankara.

Chouksey, M.K., & Venkateshwarlu, G. (2016). A. Jeyakumari, G. Janarthanan. *Journal of Food Science Technology*, 53, 856-863.

Colantuono, A., Ferracane, R., & Vitaglione, P. (2016). In Vitro bioaccessibility and functional properties of polyphenols from pomegranate peels and pomegranate Peels-Enriched cookies. *Food & Function*, 7(10), 4247-4258.

Coronel, E.B., Guiotto, E.N., Aspiroz, M.C., Tomás, M.C., Nolasco, S.M., & Capitani, M.I. (2021). Development of Gluten-Free premixes with buckwheat and chia flours: Application ın a bread product. *LWT*, 141, 110916.

Cölyak rehberi (2019). T.C. Sağlık Bakanlığı Yayın No: 1111

Davis, P.H. (1972). *Flora of Turkey*. Edinburg University Pres, Vol. IV Edinburg.

Değerli, C., & El, S.N. (2019). Optimum beslenmede sağlıklı atıştırmalıkların yeri. *GIDA*, 44(6), 988-999.

Demir, B., & Bilgiçli, N. (2018). *Çimlendirilmiş kinoa ununun glutenli ve glutensiz makarna üretiminde kullanım imkanları* (Doktora Tezi). Necmettin Erbakan Üniversitesi, Konya,

Doğdubay, M. (2015). Mezopotamya mutfağı. Içinde: Yılmaz H., Dündar A., (Ed.), *Gastronomi Tarihi.* Anadolu

Universitesi Yayınları, Eskişehir.

Eğe, Z.R, Akan, A., Oktar, F.N., Kalkandelen, C., & Gündüz, O. (2017). Production of starch nanoparticles by electrospraying as a delivery system for vanilli. *Medical Technologies National Congress (TIPTEKNO),* Trabzon, 1-4. 10.1109/ TIPTEKNO.2017.8238095

Erdoğan, S.S. (2010). *Elma posası tozunun antioksidan aktivitesi ile fenolik bileşenlerinin belirlenerek ekmek yapımında kullanım olanaklarının araştırılması* (Doktora Tezi). Namık Kemal Universitesi, Fen Bilimleri Enstitüsü, Tekirdağ.

Ergün, K., Çalışkan, G., & Dirim, S.N. (2016). *Dondurularak kurutulmuş kivi (Actinidiadeliciosa) dilimlerinin kurutma ve rehidrasyon kinetiğinin belirlenmesi*. Isı ve Kütle Transferi, 52(12), 2697-2705.

Eroğul, D., Oğuz, H.I., & Sen, F. (2016). Ekşi, mayhoş ve tatlı nar genotiplerine ait meyvelerin depolama süresince bazı fiziksel ve kimyasal özelliklerinin belirlenmesi. *Meyve Bilimi*, 2.

Estévez, A.M., Fontanot, M., Pak, N., & Sáenz, C. (2000). Oatmeal cookies enriched with cactus pear flour as dietary fiber source: Physical and chemical characteristics. In *IV International Congress on Cactus Pear and Cochineal*, 581, pp. 275-278.

Fujiwara, T. (2014). Novel dried Japanese pear fruit prepared by microwave ırradiation pretreatmentand hot air drying. *Japan soc Food Science Technology,* 61(1), 27-33.

Gagneten, M., Archaina, D.A., Salas, M.P., Leiva, G.E., Salvatori, D.M., & Schebor, C. (2021). Gluten-free cookies added with fibre and bioactive compounds from blackcurrant residue. *International Journal of Food Science & Technology,* 56(4), 1734-1740.

Gocmen, D., Sahan, Y., Yildiz, E., Coskun, M., & Aroufai, I.A. (2019). Use of coffee silverskin to improve the functional properties of cookies. *Journal of Food Science and Technology-Mysore*, 56(6), 2979-2988.

Güdücü, F. (2014). *Pyrus Elaeagrifolia bitkisi ekstrelerinin fenolik madde içerikleri, dpph radikali giderme aktiviteleri ve ın vitro antimikrobiyal etkilerinin belirlenmesi* (Yüksek Lisans Tezi). Trakya Universitesi, Fen Bilimleri Enstitüsü, Edirne.

Güneş, E., Biçer Bayram, S., & Erçetin, H.K. (2019). Palm yağının ın vıvo kullanımı. *Ulusal Çevre Bilimleri Araştırma Dergisi*, 2(2), 61-68.

Hayit, F., & Gül, H. (2015). Karabuğday'ın sağlık açısından önemi ve unlu mamüllerde kullanımı. *Uludağ Universitesi Ziraat Fakültesi Dergisi*, 29(1), 123-132.

Hultén, B., Broweus, N., & Van Dijk, M. (2009). What is sensory marketing?. *Insensorymarketing. Palgravemacmillan*, London, 1-23. doi.org/10.1057/9780230237049_1

Ismail, T., Akthar, S., Riaz, M., & Ismail, A. (2014). Effect of pomegranate peel supplementation on nutritional, organoleptic and stability properties of cookies. *International Journal of Food Sciences and Nutrition*, 65(6), 661- 666.

Işın, P.M. (2018). *Avcılıktan gurmeliğe yemeğin kültürel tarihi*. Yapı Kredi Yayınları, ss. 12-16. İstanbul.

Izli, G. (2018). Effects of different drying applications on the some quality characteristics of pear fruit. *Turkish Journal of Agriculture-Food Science and Technology,* 6(4), 479-485.

Jan, K.N., Panesar, P.S., & Singh, S. (2018). Optimization of antioxidant activity, textural and sensory characteristics of gluten-free cookies made from whole Indian Quinoa Flour. *Lwt*, 93, 573-582.

Jnawali, P., Kumar, V., & Tanwar, B. (2016). Celiac disease: Overview and considerations for development of Gluten-Free foods. *Food Science and Human Wellness*, 5(4), pp. 169-176, 10.1016/j.fshw.2016.09.0

Kabas, O., Ozmerzi, A., & Akıncı, I. (2006). Physicalproperties of cactuspear (Opuntiaficusindia L.) grownwild In Turkey. *Journal of Food Engineering,* 73(2), 198–202. doi:10.1016/j.jfoodeng.2005.01.016

Karaoğlu, M.M. (2018). *Bayatlamış farklı ekmek çeşitlerinden elde edilen unların kurabiye kalitesi üzerine etkisi* (Doktora Tezi). Atatürk Üniversitesi, Fen Bilimleri Enstitüsü, Erzurum.

Közleme, O. (2012). *Türk mutfak kültürü ve din* (Doktora Tezi). Marmara Üniversitesi, Sosyal Bilimler Enstitüsü, Istanbul,

Krivokapić, S., Vlaović, M., Damjanović Vratnica, B., Perović, A., & Perović, S. (2021). Biowaste as a potential source of bioactive compounds—a case study of raspberry fruit pomace. *Foods*, 10(4), 706.

Kumari, N., Sindhu, S. C., Rani, V., & Kumari, V. (2021). Shelf life evaluation of biscuits and cookies ıncorporating germinated pumpkin seed flour. *International Journal of Current. Microbiology and. Applied. Science*, 10(01), 1436-1443.

Layne, R.E.C., & Quamme, H.A. (1975). *Advances in fruit breeding*. PurdueUniv. Press, West Lafayette, Indiana, 38-70.

Magda, R.A., Awad, A.M., & Selim, K.A. (2008). Evaluation of mandarin and navel orange peels as natural sources of antioxidant in biscuits. Alex. *Journal Food Science & Technology Special Volume Conference*, 75-82.

Michalska, A., Wojdylo, A., Lech, K., Lysiak, G.P., & Figiel, A. (2016). Physicochemical properties of whole fruit plum powder sobtained using different drying technologies. *Food Chemistry*, 20, 223-232.

Murathan, Z.T., Erbil, N., Düzgüner, V., & Arslan, M. (2019). Şakok armudunun (pyrus elaeagnifila pallas) antioksidan, antimikrobiyal ve mutajenik özelliklerinin incelenmesi. *Erzincan Universitesi Fen Bilimleri Enstitüsü Dergisi*, 12(1), 447-456, ISSN: 1307-9085, e-ISSN: 2149-4584.

Mutlu, C., Tontul, S.A., Candal, C., & Erbaş, M. (2019). Bazı tahıl benzeri ürünlerin glutensiz kek üretiminde kullanımı. *GIDA*, 44(5), 770-780.

Nawirska, A., Figiel, A., Kucharska, A. Z., Sokół-Łętowska, A., & Biesiada, A. (2009). Drying kinetics and quality parameters of pumpkin slices dehydrated using different methods. *Journal of Food Engineering*, 94(1), 14-20.

Ning, X., Wu, J., Luo, Z., Chen, Y., Mo, Z., Luo, R., & Wang, L. (2021). cookies fortified with purple passion fruit epicarp flour: Impact on physical properties, nutrition, in vitro starch digestibility, and antioxidant activity. *Cereal Chemistry*, 98(2), 328-336.

Oğur, S. (2015). Su ürünleri kalitesinin değerlendirilmesinde koku algılama sensörlerinin geliştirilmesi ve uygulamaları. *Food and Health*, 1(1), 1-11.

Ozaydın, A.G., & Ozçelik, S. (2014). Effect of oven drying on some physiochemical properties of Ankara pear. *Akademik Gida*, 12(4), 17-26.

Ozbek, S. (1978). *Ozel meyvecilik*. Çukurova Universitesi Ziraat Fakültesi, 128, 486, Adana.

Ozçağıran, R., Unal, A., Ozeker, E., & Isfendiyaroğlu, M. (2004). *Ilıman iklim meyve türleri (yumuşak çekirdekli meyveler cilt-ıı)*. Ege Universitesi Ziraat Fakültesi Yayınları, 2, 200, İzmir.

Ozkaya, F.D., Durlu, F., Akbulut, B.A., & Tulga, D. (2017). Gastronomi turizmi engelleri kapsamında cölyak. *Karadeniz Sosyal Bilimler Dergisi*, 9(16), 213-228.

Ozuğur, G., & Hayta, M. (2011). Tahıl esaslı glutensiz ürünlerin besinsel ve teknolojik özelliklerinin iyileştirilmesi. *GIDA*, 36(5), 287-294.

Reddy, V., Urooj, A., & Kumar, A. (2005). Evaluation of antioxidantactivity of some plant extracts and the irapplication in biscuits. *Food Chemistry*. 90, 317-321.

Sakaldaş, M. (2014). Çanakkale yöresinde yetiştirilen "deveci" armut çeşidinde hasat sonrası 1-methylcyclopropane uygulamalarının depolama süresince. *ÇOMU Ziraat Fakültesi Dergisi*, 2(1), 109-116.

Samancı, O. (2008). *19. Yüzyıl Istanbul ve Osmanlı saray mutfak kültürü*. In Türk Mutfağı. Kültür ve Turizm Bakanlığı.

Samancı, O. (2016). Osmanlı mutfağında modernleşme. Içinde: Bilgin A., Önçel S., (Ed.),*Osmanlı Mutfağı*, Anadolu Universitesi Yayınları, 1-193. Eskişehir

Seçkin, U., G., & Taşeri, L. (2015). Yarı-Kurutulmuş meyve ve sebzeler. *Pamukkale Universitesi Mühendislik Bilimleri Dergisi*, 21(9), 414-420.

Sielicka-Różyńska, M., Jerzyk, E., & Gluza, N. (2021). Consumer Perception of Packaging: An Eye-Tracking Study of Gluten-Free Cookies. *International Journal of Consumer Studies*, 45(1), 14-27.

Susamcı, E., Otleş, S., & Irmak, S. (2011). Sofralık zeytinin besin öğeleri, duyusal karakterizasyonu ve işleme yöntemleri arasındaki etkileşimler. *Zeytin Bilimi*, 2(2), 65-74.

Sürücüoğlu, M.S., & Ozçelik, A.Ö. (2007). Türk mutfak ve beslenme kültürünün tarihsel gelişimi. *ICANAS, Uluslararası Asya ve Kuzey Afrika Çalışmaları Kongresi*, 10-15.

Tebben, L., Shen, Y., & Li, Y. (2018). Improvers and functional ıngredients in whole wheat bread: A review of their effects on dough properties and bread quality. *Trends in Food Science & Technology*, 81, pp. 10-24

Thompson, T. (2000). Folate, ıron, and dietary fiber contents of the gluten-free diet. *Journal of the Academy of Nutrition and Dietetics*, 100(11), 1389.

Tyagi, S.K., Manikantan, M.R., Oberoi, H.S., & Kaur, G. (2007). Effect of mustard flour in corporation on nutritional, textural and organoleptic characteristics of biscuits. *Journal of Food Engineering*, 80, 1043-1050.

Uchoa, A.M.A., Correia da Costa, J.M., Maia, G.A., Meira, T.R., Sousa, P.H.M., &Brasil, I.M. (2009). Formulation and physicochemical and sensorial evaluation of biscuit-type cookies supplemented with fruit powders. *Plant Foods for Human Nutrition*, 64, 153-159.

Ugwuona, F.U. (2009). Chemical and sensory evaluation of soy-fortified cassavawheat biscuit. *Agro-Science*, 8(1).

Uhri, A. (2015). Insanlığın şafağında beslenme, içinde: Yılmaz, H., Dündar, A. (ed.), *Gastronomi Tarihi,* Anadolu Universitesi Yayınları, 1-199. Eskişehir.

Ustaahmetoğlu, E. (2016). Tat algısı: Hazır kahve üzerine deneysel bir uygulama. *Kafkas Üniversitesi Iktisadi ve Idari Bilimler Fakültesi Dergisi*, 7(12), 51-64.

Westwood, M.N. (1978). *Temperate zone pomology WH freeman and company*. San Francisco.

Xu, J., Wang, W., & Li, Y. (2018). Dough properties, bread quality, and associated interactions with added phenolic compounds: A review. *Journal of Functional Foods*, 52, pp. 629-639

Yağcı, S., & Doğan, F. (2016). Ekstrüzyon yöntemi ıle mercimek (lens culinaris) bazlı glutensiz bulgur-benzeri ürün geliştirilmesi ve fiziksel-fonksiyonel özelliklerinin incelenmesi. *Selçuk Tarım Bilimleri Dergisi*, 3(1), 59-67.

Yalçın, S., & Başman, A. (2006). Glutensiz makarna ve erişte üretimi. *9. Gıda Kongresi*, Bolu, Mayıs, 24-26.

Yerasimos, M. (2014). *Evliya Çelebi seyahatnamesi'nde yemek kültürü, yorumlar ve sistematik dizin*. Kitap Yayınevi, Istanbul.

Yilmaz, K.U., Ercisli, S., Cam, M., Uzun, A., Yilmaztekin, M., Kafkas, E., & Pinar, H. (2015). *Fruit weight, total phenolics, acidity and sugar content of edible wild pear (Pyrus Elaeagnifolia Pall.) fruits*. Erwerbs-Obstbau, 57(4), 179-184.

Zanoelo, E.F., Cardozo-Fılho, L., & Cardozo-Júnıor, E.L. (2006). Superheated steam-drying of mate leaves and effect of drying conditions on the phenol content. *Journal of Food Process Engineering*, 29(3), 253-268.