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# Heritage of the Anatolian geography: registered varieties of ancestral wheat (siyez, gacer, and menceki)

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## Abstract

Turkey is one of the major regions of wheat cultivation where wheat has economic, social, cultural, and archaeological values. The Anatolian lands are the homeland of wheat and the gene center of ancestral wheat varieties. Having survived without any genetic modification, ancestral wheat is a biological and cultural heritage. The rich nutritional value, unique flavor, and aroma of ancestral wheat varieties make them more valuable than their modern equivalents. However, prioritizing the production of modern wheat varieties has prompted the oblivion of ancestral ones and a decline in their production. This study aimed to raise awareness about the registered ancestral wheat varieties (i.e., siyez, gacer, and menceki), the cultural heritage of Anatolia, which has sunk into oblivion. To this end, it tackled the general characteristics of ancestral wheat varieties, an indispensable part of the Turkish cuisine, their nutritional value, and their use in local cuisines. Increasing the use of these registered ancestral wheat varieties in local culinary cultures and ensuring the sustainability of local values increases the significance of this study.

**Keywords** Wheat, Ancestral wheat, Cultural heritage, Anatolia, Siyez, Gacer, Menceki

## Introduction

In Turkey, it is still possible to find areas where our cultural values, such as local varieties, are prioritized, our traditional values continue to be protected, and development studies based on this are initiated. One such value is ancestral wheat. In addition to being a strategic product of wheat, with a history of 10,000 years in Anatolia, ancestral wheat is a cultural heritage [1–3]. As such, Turkey is the homeland and gene center of wheat. Having been cultivated globally for centuries, wheat varieties are obtained from "hereditary seeds," which are ancestral heritage. Ancestral wheat varieties are an essential gastronomic element that have survived through the

pressures of natural and artificial selection, have not been genetically modified, and appeal to local tastes. They have been humanity's most basic gastronomic element from the past to the present.

Considered the ancestor of wheat, "ancestral wheat" constitutes 0.0727% of Turkey's annual wheat production of 22 million tons [4]. The rapid spread of modern wheat varieties with high grain yield obtained by the improvement studies that started with the green revolution has prompted a decline in ancestral wheat production. This has consequently expedited the genetic erosion of local wheat varieties born in the "Fertile Crescent Region" about 10 thousand years ago and survived until today.

In this context, supporting the local wheat varieties produced globally in small quantities makes it essential to protect these resources and transfer them to future generations. Also registered by the Turkish Patent and Trademark Office, "Kastamonu Siyez, Kayseri Develi Gaceri, and Elazığ Menceki" wheat varieties are

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protected by geographical indications. In addition to all these activities to protect ancestral wheat varieties that have been among the staple foods since ancient times, this study aimed to raise their awareness and reveal their importance to cultural heritage. In this regard, this study tackled the general characteristics of ancestral wheat varieties, an indispensable part of Turkish cuisine, their significance for nutritional value, and their use in local cuisine.

## Methodology

The present study, the place of registered ancestor wheats (siyez, gacer, menceki), which is the cultural heritage of Anatolia, in Turkish Cuisine culture is mentioned by using scientific articles from different databases such as Google Scholar, Scopus, Elsevier, Ulakbim, and Dergipark.

It has been observed that the studies on the use of "Kastamonu Siyez, Kayseri Develi Gaceri, Elazığ Menceki" wheats, which are also registered by the Turkish Patent and Trademark Office, in the field of gastronomy are limited. In this sense, data were collected for the study through comprehensive document analysis in order to explain the history, rituals, use of these ancestral wheats in Turkish Cuisine culture, and their recipe examples and their effects on health.

## Conceptual framework

### Wheat in Turkish culinary culture

Culinary culture is a reflection of the shaping of talent and skill with the geography where one lives. Food and culinary cultures overly bear the effects of geography and point to the cultural values that form the relationship of a place with taste. Food products are not mere objects but the reflection of the knowledge and skills of rural societies as a result of their relations with nature. Geography has shaped people and cuisines and given them an identity. The local flavors in foods, therefore, reflect the geography lived [5–7]. Wheat and wheat products formed the basis of Anatolian Turkish culinary culture since wheat is a custom from the Central Asian culture and Anatolian lands are the homeland of wheat [8, 9].

Constituting an ancient culture in the Anatolian lands, wheat and wheat products have taken their place in both culinary and verbal cultures, so much so that wheat has been the primary food source in Anatolia and has been viewed as a cultural, social, and historical value [10]. Wheat has therefore been regarded more than food, as a fertility, date, and tradition. It has also been viewed as a symbol of fertility, a value that should not be dropped or wasted. An ancient product for all civilizations have lived in Anatolia from the past to the present; wheat has taken its place in celebrations, weddings, feasts, and death

ceremonies. In this sense, wheat and wheat products have become foods of great value that are revered and attributed to sacredness [10–12]. Wheat is not only used as the main ingredient of the dishes in Turkish cuisine but is also consumed as bulgur [ground wheat], cracked wheat, semolina, and flour. Obtained by boiling the wheat properly, drying, breaking, and thinning after peeling, these products are among the indispensable foods of Turkish culinary culture [9].

Bulgur is acquired by boiling and grinding wheat. It is divided into coarse and fine bulgur according to its place of use. Cracked wheat (dövmé) is the wheat whose bran is separated by being beaten with wooden pestles on large stone mortars (Fig. 1) to separate the dried wheat from its scabs. It is used in some soups and Ashura desserts [8].

Semolina is one of the processed forms of wheat and is obtained by grinding it. Also known as coarse and semolina flour, semolina is generally used in desserts and bakery products [14].

Ancient people ground wheat by beating it in large stone mortars and, over time, replaced them with stone hand mills (Fig. 1) with circular rotation movement. Wheat was ground into flour using stone mills. Moved by human and animal power in the early times, these stones were run by wind and water power over time. Today, technological developments have enabled the grinding of wheat in modern factories [14]. Bread is one of the most valuable wheat products in Anatolia. Many local-specific bread types have emerged with local production techniques and tastes. Among these are phyllo (yufka), lavash, tandoori, thin, fatir, kömbe, chapati, and unleavened, as well as the local ones made with such ingredients as potatoes and chickpeas [10]. As a reflection of the Turkish Culinary culture, wheat and wheat foods are served in different ways as soups, dishes, patties, or bread on weddings, holidays, and special occasions [9, 15]. Many works remaining of several Anatolian civilizations also show that wheat has been an indispensable food item in Turkey [10–12]. Viewed as the driving force of cultural formations, wheat has been considered sacred in Anatolian lands and has been the source of many rituals, some of which are:

**Keşkek** In Anatolia, keşkek is prepared by cooking wheat with meat, beating it until it becomes a paste, and drizzling clarified butter. Keşkek varies from region to region in terms of cooking methods and ingredients. Handed down by the Anatolian communities from the past to the present, this heritage has become a cultural phenomenon due to its symbolic characteristics. The most salient symbolic characteristic of the traditional ceremonial keşkek is that it is made in unity and solidarity as a ritual in certain ceremonies. Due to this characteristic,



**Fig. 1** Stone Mortar and Hand-mill [13]. Since ancient times, people have developed different methods to separate the grains from their husks, crush them, and turn them into flour. Large stone mortars, one of the most important methods used for grain processing, were used to separate the husks from the grains and turn them into flour (a) This is called the grinding process by striking (beating) the grains in the carved stone. Hand mills with circular rotational movements have replaced this beating over time. Hand mills have two parts, and the upper and lower hand mill stones comprise two same-sized stones (b)

keşkek was added to the Intangible Cultural Heritage List of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2011 as a "ceremonial keşkek tradition" dish [16].

**Ashura** An indispensable tradition of the Turks, ashura, is a ritual to ensure unity and solidarity. Despite the variations in the amount and type of ingredients in ashura from the past to the present, wheat has been the main ingredient in all ashura recipes. Boiled wheat, dried beans, chickpeas, dried apricots, walnut kernels, almonds, figs, seedless raisins, water, granulated sugar, orange peels, and rose water are used for pudding. For decoration, cinnamon, pomegranate seeds, walnut kernels, hazelnuts, pistachios, cloves, nutmeg, and chopped orange peels are used. Prepared and cooked in houses with 41 different ingredients, ashura is offered to nearby neighbors after being cooked and ready for serving. It is safe to say that this tradition, maintained culturally and religiously in Turkey, is the day when all elements belonging to the fundamental values of brotherhood, unity and solidarity, friendship, cooperation, love, and respect are prioritized [17].

**Tooth wheat** Wheat is boiled when a newborn child teethes. This wheat is called tooth wheat or *diş hediği* and is consumed by neighbors and relatives [10].

#### Turkey's ancestral wheat varieties

Local wheat varieties are often referred to as "hereditary wheat" in public. Wheat is the oldest kind of grain and is defined as an "heirloom variety," meaning "a value passed from generation to generation." Archaeological studies show that the place where wheat first appeared and

spread to the world was the "Fertile Crescent." The first cultivated wheat species in the world are Einkorn (siyez) and Emmer wheat. Archaeological studies based on modern DNA fingerprint data show that wild Einkorn wheat (*T. monococcum*) was first cultivated near Karacadağ, which is located within the borders of Siverek district of Şanlıurfa in the Southeastern Anatolia Region of Turkey [4].

Ancestral wheat is a wheat variety grown in a particular region for at least one generation. Having a genetic resource and usually a local name (e.g., Kastamonu Siyez, Develi Gaceri, Elazığ Menceki), ancestral wheat has not experienced an official improvement process but a process of adaptation to the local conditions of the area in which it is grown, and is compatible with the local knowledge, habits, and traditions of the communities that developed it. Cultured forms of ancestral wheat were grown in various parts of Anatolia, especially starting from the northern part of the Fertile Crescent, and spread from Anatolia to the whole world. Turkey is a significant gene center hosting 23 wild ancestral wheat varieties (e.g., *Triticum*, *Aegilops*, *Amblyopyrum*, *Dasypyrum*), especially in the primary and secondary gene pools [4, 18].

The ancestral wheat population in Turkey consists of 58.28% bread wheat, 37.93% durum wheat, and 3.79% coarse wheat. Being an important center in Turkey, the Southeastern Anatolia Region ranks first in terms of variety. Table 1 shows the natural distribution of ancestral wheat varieties by region in Turkey [4]. Siyez wheat (*Triticum monococcum* L. subsp. *monococcum*) is one of our oldest ancestor wheat varieties [19].

**Table 1** List of ingredients and the cooking methods of the foods with siyez, gacer, and menceki wheat/bulgur


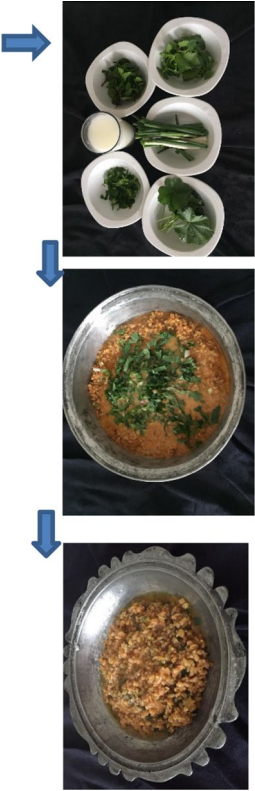
Method	
<i>Ihsangazi Sour Pilaf Ingredients</i> 450 g siyez bulgur 1 onion 2 green peppers 30 ml sunflower oil 30 g butter 800 ml water 10 g salça (a mix of tomato and pepper paste) 500 ml sour ayran or 300 g yogurt 6 g salt 5 g red pepper flakes 7 g	 <p>Drain the cleaned and rinsed Kastamonu siyez bulgur. Chop the green peppers and onion and stir-fry until pink</p> <p>Add salça, hot pepper paste, and Kastamonu siyez bulgur to the mix and fry for 1–2 min, then add 4 cups of water and cook for 20 min</p>
<i>Dried Spearmint Greens</i> 1 bunch of parsley, dill, mallow, fresh nettle ¼ bunch of scallions Half a bunch of spearmint Half a bunch of green pepper leaves 5–6 vine leaves Fry the butter in a copper pan, and when it foams, pour it over the mix and serve hot [30]	 <p>Fry the butter in a copper pan, and when it foams, pour it over the mix and serve hot [30]</p> <p>and cook for 5 more minutes</p> <p>Add sour ayran or yogurt and finely chopped greens,</p>

Table 1 (continued)













Method	
<p><i>Harput Meatball Ingredients</i></p> <p>500 g lean ground beef</p> <p>300 g fine menceki bulgur</p> <p>1 onion</p> <p>1 egg</p> <p>25 g butter</p> <p>25 g tomato paste</p> <p>25 g pepper paste</p> <p>1 water</p> <p>Dry purple basil</p> <p>Parsley</p> <p>Red pepper flakes</p> <p>Salt</p>	<div></div> <p>Knead the mix of minced meat, fine bulgur, grated onion, parsley, salt, red pepper flakes, dry basil, and egg</p> <p>Take pieces the size of grapes from the mix</p> <div></div> <p>Fry them in a saucepan with heated oil and add tomato and pepper paste</p> <p>Place the cooked meatballs on a serving plate and serve with broth [32, 33]</p> <p>Add the meatballs to the boiling water with tomato</p>



Table 1 (continued)

Method	
<p><i>Keşkek Ingredients</i></p> <p>500 g gacer wheat A whole piece of beef brisket 300 g chickpeas 50 g butter 3 gr red pepper flakes 1.5 l water Salt</p>	<div></div> <div></div> <div></div> <div><p>Put the medium-sized chopped meat in the saucepan. Add the soaked chickpeas and wheat. Add approximately 1.5 l of water to overtop the wheat</p><p>Cook it on high heat until it comes to a boil and then on low heat for 1 h</p></div> <div></div> <div></div> <div></div> <div><p>Fry the butter in a separate pan</p><p>Crush the cooked meat thoroughly and mix until it gets a paste-like consistency</p><p>Take the mix to the serving plate once reaching the consistency of a thick paste. Add red pepper flakes on top and stir. Pour the sauce over the dish and serve [32]</p></div>

### Turkey's registered ancestral wheat varieties

In Turkey, ancestral wheat is produced only in mountain villages on rough and barren lands by small farmers' own means. Several steps are taken to sustain the production of these few local wheat varieties in Turkey today. One of these steps is registration. Considered to derive their quality and originality from the geography in which they grow, these values are protected by registration processes such as geographical indication and presidia. Three ancestral wheat varieties are protected and registered in Turkey: Siyez, Develi Gaceri, and Elazığ Menceki.

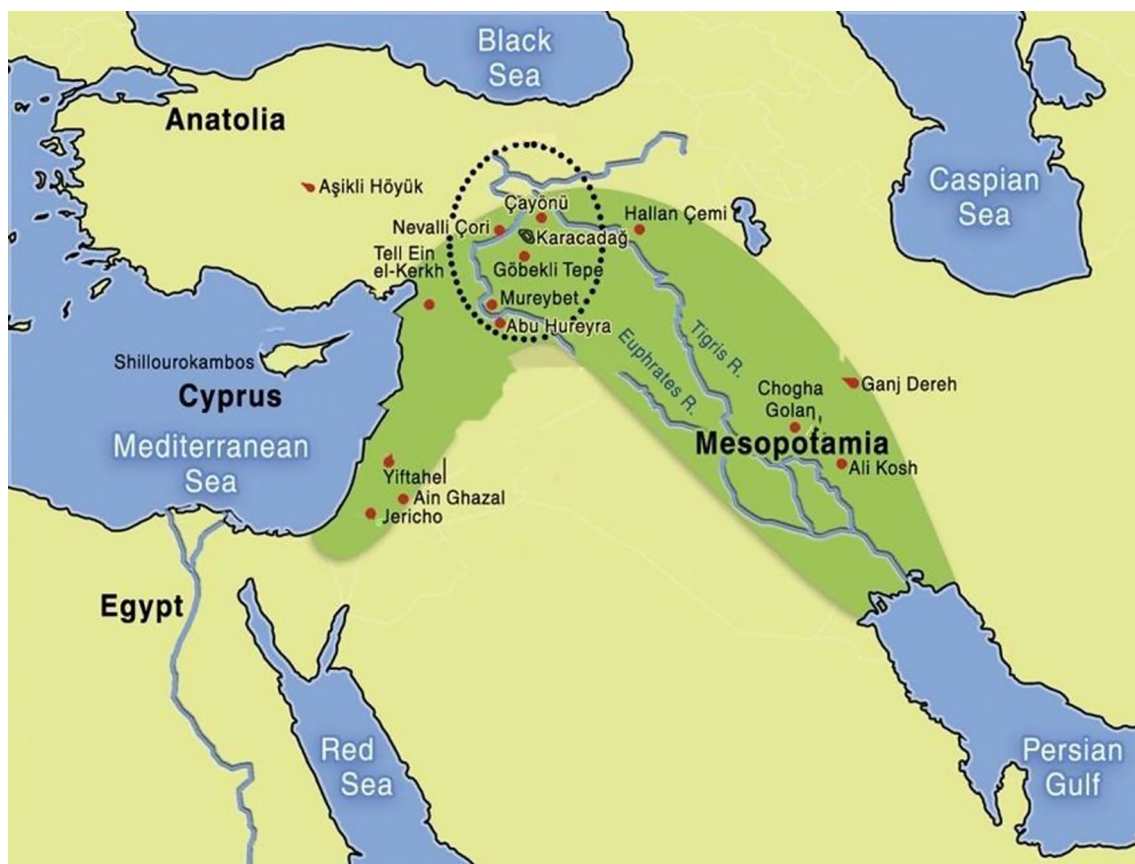
### General characteristics of Turkey's registered ancestral wheat varieties

*Siyez (Triticum monococcum)* Predicted to have been cultivated in Southeast Anatolia for the first time in the world, siyez is one of the most important cultural heritage elements of the Anatolian lands, so much so that the adventure of wheat in Anatolia is too old to be predicted. The Anatolian lands have been decisive in civilized history as the geography where wheat was improved and spread to the world for the first time on earth [4, 18]. One of the first names given to siyez wheat cultivated by many

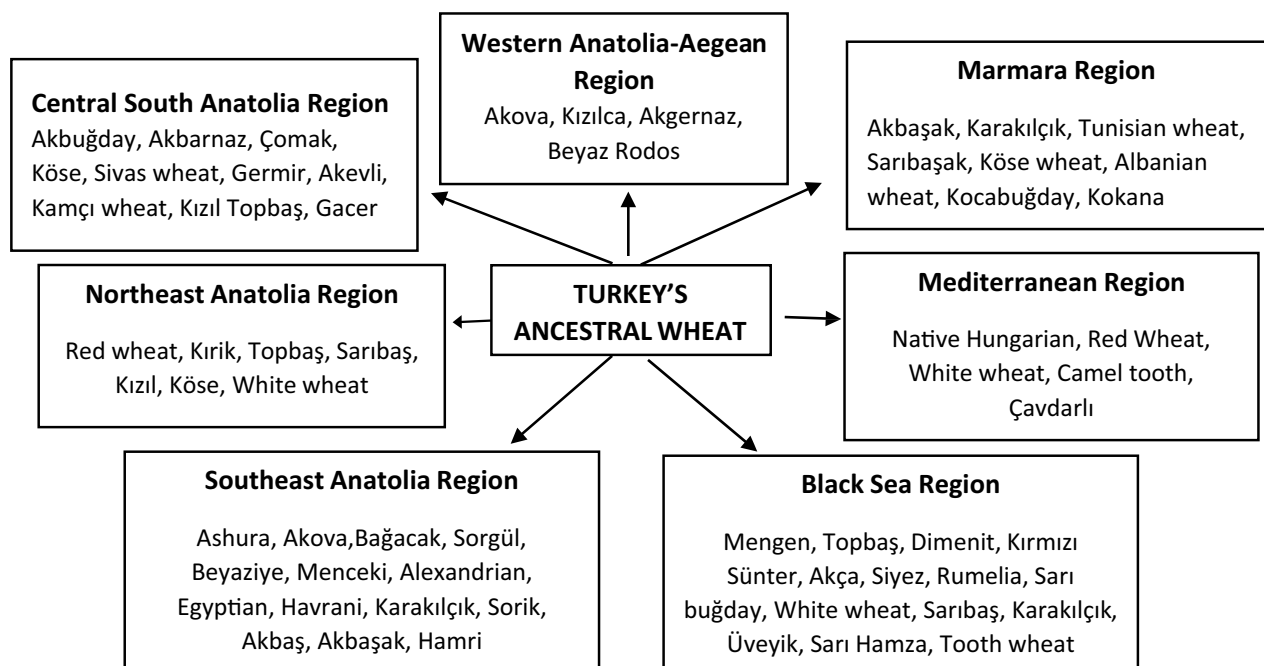
civilizations in Anatolian lands is Zız, a Hittite word [12, 20]. Siyez is one of the chief varieties of our ancestral wheat and is currently grown in northern and northern transition regions of Turkey, especially in Kastamonu. It is also grown in Balkan countries and France [10]. Siyez is not genetically modified and has a richer nutrient content than cultivated wheat varieties, which increases its value. In addition, siyez is very low in gluten. Siyez is a significant wheat variety for Anatolia not only because of its unchanged genetic structure or its more health benefits but also because it is a seed that we must protect [21] (Figs. 2 and 3).

Siyez wheat (Fig. 4a) is mainly consumed as bulgur. Boiled in hot water, siyez wheat is dried under natural conditions, cracked in stone mills, and turned into bulgur [21]. In addition to bulgur, siyez wheat is also used in making bread by turning it into flour (Fig. 4c) [12, 21]. Despite its primary use as bulgur, siyez flour is now used as tarhana, pasta, and even mantı (Turkish ravioli) [21].

It is able to find the following siyez products in the ecological markets in Turkey: noodles (with vegetables), bulgur, pasta, couscous, cracked wheat (dövmе), wheat paste, flour, whole flour, bread types (e.g., walnut, olive,



**Fig. 2** The region called "Fertile Crescent" also covers Southeastern Turkey. (Map Copyright ResearchGate)



**Fig. 3** Ancestral wheat varieties by regions of Turkey



**Fig. 4** Processes of siyez wheat **a** siyez ears, **b** siyez grains, **c** siyez flour, **d** ancient sourdough siyez bread. Einkorn wheat **a** is used for many different purposes by harvesting, **b** after it is grown. The best example of its uses in Turkish culinary culture is flour (**c**) and bread (**d**)

village, ancient sourdough siyez (Fig. 4d), and flat), buttered simit, poğça (bun), and breadsticks. With limited production area in the world and danger of extinction, siyez wheat must be preserved and transferred to future generations. For this purpose, it was protected by geographical indication in 2020. This geographical indication was registered on 25.09.2020 to be protected as of 04.01.2019 within the scope of the Industrial Property Law No. 6769 and received the designation of origin [22]. In addition, siyez bulgur is one of the three products selected from Turkey within the scope of the Presidia Project, carried out by the Slow Food Foundation in Italy to protect food products that are in danger of extinction [20].

*Develi gaceri* (*Triticum turgidum* L. var. *dicoccum*) Emmer wheat (*Triticum turgidum* L. var. *dicoccum*), known as Gacer (Fig. 5a), is an endangered ancient wheat

genus grown in Anatolia for centuries [23, 24]. Develi Gaceri is a spelt wheat obtained from the "*Triticum turgidum* L. var. *dicoccum*" variety of wheat grown in Develi, Kayseri, and called emmer (gernik). It is one of the ancestral seeds of Anatolia, with no genetic modification other than natural pollination [23].

Gacer is grown using traditional methods in Italy, Spain, Turkey, Austria, and the Czech Republic. In our country, it is still grown by a few farmers in Kastamonu, Sinop, Kars, and Kayseri Provinces. Gacer is also grown as bulgur wheat under local names such as "Çatalca" in mountainous regions in the northeast of Turkey [24]. Develi Gaceri might be ready for use by blending once removed from husks during or after harvesting Gacer (Fig. 5b). While table bulgur and rice have to undergo many fabrication processes to become the final product, gacer seeds might be used by merely separating them





**Fig. 5** Processes of Gacer wheat **a** gacer ears, **b** gacer grains, **c** gacer flour, **d** gacer bread. Gacer wheat **a** is harvested (b) after it is grown and used for many different purposes. Flour obtained from this wheat is generally preferred more in unleavened dough products (**c**, **d**)

from their husks. Its direct use in soups, meals, and pilafs makes it an alternative to rice and processed bulgur.

Rich in high-quality protein and an alternative to rice and processed bulgur, gacer wheat might be used for making pilaf, soup, dolma, and meatballs, while its flour might be used for bread (Fig. 5c, d) Gacer cakes and halva [23–25]. In addition, gacer is a variety of wheat frequently sought for obtaining unleavened bakery products in the region [12]. Develi Gaceri was registered on 22.06.2022 to be protected as of 26.01.2021 within the scope of Industrial Property Law No. 6769 and received a geographical indication [26].

*Elazığ menceki wheat (Triticum durum ssp. Compactum)* Elazığ Menceki wheat is obtained from the *Triticum durum ssp. Compactum* (club wheat) subspecies, *Triticum* (wheat) genus. This geographical indication was registered on 16.09.2021 to be protected as of 02.03.2021 under Industrial Property Law No. 6769 [27]. Elazığ Menceki wheat is a wild emmer variety that occurs naturally in nature and has preserved its genetics. Produced from its own seed, this wheat variety depends on the geographical border concerning the production method. Being a 4,000-year-old ancestor seed, Elazığ Menceki wheat (Fig. 6a) is also frequently used in dishes and soups

in the region [27]. Its use as bulgur (Fig. 6b) is especially more common. It has a central place in the local cuisine as the main ingredient of dishes unique to Elazığ cuisine, such as pilaf types, stuffed meatballs, kısır (bulgur-based salad), tarhana, keşkek, sarma (stuffed vine leaves) types, and Harput meatballs. Depending on the climate and soil structure of Elazığ, the unique taste and smell of Menceki bulgur is the most significant predictor of consumer preferences. Therefore, the most salient feature of this bulgur, along with its taste and smell, is that it does not become doughy [28, 29].

#### Traditional recipes with the registered wheat varieties

Wheat is one of the fundamental ingredients of Turkish cuisine, and foods such as bulgur, semolina, and flour obtained from wheat have great importance. The variety of food made from grain products is therefore also pretty high. Table 1 presents the traditional recipes made from these wheat varieties.

*İhsangazi Sour Pilaf is one of the most well-known dishes of Kastamonu Province cuisine and has a long history. It is traditionally served on special occasions such as weddings and holidays, where local people*



**Fig. 6** Processes of menceki wheat **a** menceki ears, **b** menceki grains, **c** menceki flour, **d** menceki bread. Menceki wheat **a** is harvested, **b** after it is grown and used for diverse purposes. Apart from its widespread use as bulgur, this wheat is also used in making bread **d** by turning it into flour (**c**)

gather. Following the wheat harvest in the region, gathering in the village squares to celebrate the siyez harvest has become a tradition [30].

Unique to the Harput region, this meatball is made on many special occasions, such as holidays, weddings, and festivals. Bearing the district's name, this dish is one of the first delicacies many tourists from outside the city and the country try when introducing the region. It is one of the essential dishes offered to the guests of the restaurants in the region, served by local dishes on their menus [31].

Keşkek, on the other hand, is a traditional Anatolian dish that differs according to region, is usually made at weddings and holidays, and comprises mainly of cracked wheat and meat. Keskek is 'the ceremonial dish obtained by cooking wheat and meat together in large cauldrons and open fire through participation and work sharing.' It is well-established that within the borders of Anatolia, the content and cooking methods of Keşkek show some differences, albeit small, in all regions [33]. It is also known that Keşkek is made locally in almost every Anatolian region. It has been named differently across the regions: 'dövme pilavı' or 'dövme aşı' in Hatay, Adana, and Gaziantep, 'herse' in Rize, 'herise' in Konya and Gaziantep, 'hırsı' in Hatay, and 'gendirme pilavı' in Erzincan [34]. Keşkek is of Persian origin as a word. Additionally, it is called 'herise' in Arabic and 'döğme aşı' in Turkish [35]. Keskek dish is included in Mevlana's work called 'Mevlevi Cuisine' with the name "herise" [36].

#### Nutritional value and health effects of ancestral wheat

With a history as old as human history, wheat is considered the most important food for global consumption. FAO statistics reveal that the annual wheat consumption per capita is 173.5 kg, while this figure is 79.5 kg in the USA, 85.4 kg in Germany, and 106.4 kg in France. These figures suggest that we live in a world mainly fed with wheat products [10]. 19% of the daily calories and 21% of the protein needed for humans are obtained from wheat. In addition to being a source of starch and energy, wheat grains have several beneficial components with protein, vitamins, dietary fiber, phytochemicals, and antioxidant activities necessary for health. Furthermore, whole wheat

grains are the most suitable food source created according to human metabolism and needs [37]. Among the wheat varieties, ancestral wheat is considered a functional food with its rich nutritional content. Ancestral wheat has been given functional food status due to its properties, especially its high fiber content, higher antioxidant compound concentrations, high protein digestibility, positive effects on the gut, and less harmful effects on gluten-sensitive people [38]. For this reason, the ancestral wheat varieties registered in Turkey (i.e., siyez, Develi gaceri, menceki) and their effects on health have aroused interest among consumers and researchers [39]. Table 2 compares the nutritional properties of refined and registered ancestral wheat varieties.

The most salient feature of ancestral wheat varieties is that their genetic features and DNA cannot be modified. With high nutritional value, ancestral wheat varieties are unrefined primitive wheat consumed in the past. Ash, protein, fat, zinc, calcium, and iron content of ancestral and other refined wheat varieties are given in Table 2. As this table indicates, the higher nutritional value of ancestral wheat varieties, including protein, minerals, vitamins, fibers, and fat, than the refined ones suggests their health benefits. Research has shown that ancestral wheat varieties (i.e., siyez, gacer, menceki) have higher antioxidant content and lower glycemic index. It has also been stated that they are high in lysine, glutamic acid, carotenoid, lutein, phenolics, and tocopherol [45, 46]. Additionally, their protein content (13.2–14.83 gr/100 gr) was found to be higher than that of other refined wheat varieties (10–12 gr/100 gr). In this case, compared to today's commercial wheat varieties, the protein content of ancestral wheat varieties is higher, with a low carbohydrate ratio. It, therefore, suggests that ancestral wheat is healthier than other refined flour. In this sense, mainly high-protein bulgur is obtained after the hulls are tempered and separated from the grains of siyez, gacer, and menceki wheat. In addition, noodles, tarhana, pasta, village bread, and wheat paste are made [3, 19, 47, 48].

As Table 2 displays, ancestral wheat varieties have higher oil content than the refined ones. Their high-fat content also makes them more delicious than bakery products from other wheat varieties [19]. An examination of the vitamin content of siyez wheat, one of the ancestral

**Table 2** A comparison of refined and registered ancestral wheat in terms of nutritional properties. Source: [40–44]

Wheat variety (100 g)	Ash (g)	Protein (g)	Fat (g)	Gluten amount (ppm)	Zinc (mg)	Calcium (mg)	Iron (mg)
Gaceri wheat	1,74–1,78	13,82–13,99	2,28–2,53	77,68–81,31	27,41–28,14	141,1–146,1	28,04–29,55
Siyez wheat	2,48	14,83	2,19	32	5,32	32,26	4,21
Menceki wheat	1,35	13,2	–	36,1	25,2	709,9	35,3
Bread wheat	0,55–0,85	10–12	1,5–2	28–35	2,81	25–64	3,17–6,81

wheat varieties, showed that the amount of folic acid, which plays a role in forming blood cells and preventing anemia, was higher than in other wheat varieties [49].

Ancestral wheat varieties are also rich in minerals such as calcium, iron, and zinc compared to other refined bread (common) wheat. Especially the iron, calcium, and zinc composition of Develi Gaceri and Elazığ Menceki wheat is higher than the mineral content of bread wheat. Based on all these features, the chemical components of ancestral wheat varieties have a protective role in reducing the risk of coronary heart disease, Type 2 diabetes, hypertension, and some types of cancer. Research has also shown that they help with weight management [50–53].

## Conclusion

This study examined the registered non-genetically modified ancestral wheat varieties grown in Turkey. Wheat is a staple food considered sacred and valued in the Anatolian culture. Used in many traditional dishes in Turkish culinary culture, wheat has become not only a food but also a cultural phenomenon. Both the meanings attributed to it in traditional culinary culture and its leading role in many food rituals have brought wheat to the fore. The Anatolian lands are the point of origin of wheat, and it has been produced in this region for years, contributing significantly to the formation of all this cultural accumulation. In the twenty-first century, many wheat varieties cultivated by preserving their first domesticated form are still present in Anatolia. However, some native ancestral seeds were improved and genetically modified with the green revolution to increase wheat production. The ancestral seeds that survived in their original forms without being genetically modified resemble biological heritage. Conservation of this heritage and supporting the production and protection of these seeds are significant to ensure their sustainability and delivery to future generations.

Turkey has great potential for biological diversity, genetic resources, and local products. These values are protected and registered by the Turkish Patent and Trademark Office. The siyez, gaceri, and menceki wheat varieties have been registered and protected in Turkey. Their genetic features are protected, and they are granted geographical indications by establishing a connection with their origin of production. These geographical indications might prevent these wheat varieties from being lost culturally and biologically and ensure the transfer the traditional knowledge and usage practices to future generations. The protection of local varieties should not be limited to the registration process. Farmers should be

supported in line with national targets and policies, and production should be boosted. In addition, the culinary culture should be endorsed with traditional recipes of local products such as ancestral wheat. In this context, marketing and promoting the recipes of ancestral wheat varieties in culture through local stories is crucial for creating awareness. In this sense, it is essential to boost the production and consumption of these wheat varieties, qualifying as cultural heritage, which are about to disappear with the spread of modern wheat varieties.

## Implications for gastronomy

Bread is the most significant product identified with wheat in every field of its production. In Anatolian culture, bakery products are not limited to bread but include popular bakery products such as phyllo, kadayıf, bulgur, noodles, couscous, pasta, and keşkek. All these products are significant milestones for local development dynamics. The production of these local products using registered local wheat varieties along with individual methods and techniques is thought to increase awareness of the products, sustainability of local wheat varieties, preservation of culture, and local development.

Ancestral wheat varieties are rich in nutritional value, albeit low in yield and hard to harvest than the modern ones. Their higher nutritional content than modern wheat makes them valuable as a functional food. With these features, ancestral wheat varieties are an alternative food source for consumers aspiring for a healthy diet.

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## Consent for publication

All authors agree for this publication.

## Competing interests

All authors declare there are no competing interests regarding this publication.

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## References

- Morris CF, Rose SP. Wheat. Cereal Grain Qual. 1996:3–54.
- Sezer M. Use of local and ecological products in tourism marketing: example of Kastamonu einkorn products. Doctoral Dissertation, Kastamonu University; 2021
- Mızrak G. Buğdayla İlgili Bilimsel Gerçekler. 2017.
- Turkey's Wheat Atlası. Wwf-Türkiye (Doğal Hayatı Koruma Vakfı ), İstanbul, Türkiye; 2016.
- Nizam Bilgiç D. New rural development versus the familiar rural motherhood: the commercialization of local foods and its effect on gender roles AU. İstanb Univ J Sociol. 2020;40(1):79–108.
- Kul N. Mutfak Kimlik Diplomasi, *Türkiye'de Gastro Diplomasi*. Tün Eğitim Yayınları, Çankaya/Ankara; 2019.
- Sezgin AC, Onur M. Kültür Mirası Düşün Yemekleri'nin Gastronomi Turizmi Açısından İncelenmesi: Erzincan İli Örneği. Erzincan Üniversitesi Sosyal Bilimler Enstitüsü Dergisi. 2017;203:214.
- Şeren-Karakuş S, Küçükkömürler S, Ekmen Z. Bulgur in Turkish Culture 38. İcanas-Uluslararası Asya Ve Kuzey Afrika Çalışmaları Kongresi. Maddi Kültür. 1. Ankara. 2008:1179–1190.
- Ardıç Yetiş Ş. The place and importance of Bulgur in Turkish Cuisine. J Turk Tour Res. 2020;4(1):716–28.
- Özberk F, Karagöz A, Özberk I, Atıl A. From genetic resources to landraces and registered varieties; wheat and bread in Turkey. J Field Crops Central Res Inst. 2016;25(2):218–233.
- Atar B. The wheat as our basic food, past to future journey. Süleyman Demirel Üniversitesi Yalvaç Acad J. 2017;2(1):1–12.
- Atak M. Wheat and wheat landraces of Turkey. J Agric Fac Mustafa Kemal Univ. 2017;22(2):71–88.
- Tuncer I. Tahılın Öğütülme Tarihi “Hamelede: Değirmen” Tahılın Öğütülme Tarihi. 2022. Accessed 24 Nov 2022.
- Akar Şahingöz S, Ceylan F. Tatlı ve Pasta Üretimi. Tatlı ve Pasta Üretiminde Kullanılan Malzemeler. Nobel Yayıncılık; 2022.
- Üzülmmez M, Onur M. A research on food rituals in Osmaniye Culinary culture. J Turk Tour Res. 2021;5(2):1349–413.
- Teyin G. A cultural heritage; ceremonial keşkek tradition. Gastroia J Gastron Travel Res. 2020;4(2):313–21.
- Saçıkara M. The historical process of Ashura In Turkish cuisine culture. T.C. University Of Gaziantep Graduate School of Social Sciences Department of Gastronomy and Culinary Arts. Master's Of Art Thesis; 2015.
- Ceyhan Sezgin A, Bülbül S. Wheat In Turkish art and cuisine culture. J Int Soc Res. 2017;10(54):1307–9581.
- Han Ş, Ertop MH. Some chemical and physical properties of einkorn wheat (*Triticum monococcum*) Cultivated in Kastamonu (Turkey). J. Akademik Gıda. 2022;20(1).
- Özberk I, Karagöz A, Atay S, Kalem S, Araç N. Anadolu'nun Buğday Mirası Siyez, Gernik, Havran. Printworld. 2017 ISBN: 978-605-9903-12-7. Wwf-Türkiye.
- Şimşek N. Siyez Buğdayı Hakkında Her Şey. Buğday Ekolojik Yaşamı Destekleme Derneği; 2018.
- Türk Patent1. Kastamonu Siyez Buğdayı. Coğrafi İşaret Sicil Belgesi, Menşe Adı; 2022.
- Sazak F. Determination of Composition and Technological Properties of the Local Emmer Wheat (Gacer). Hacettepe Üniversitesi, Gıda Mühendisliği Anabilim Dalı, Yüksek Lisans Tezi; 2022
- Bulut S. Develi Gacer Buğdayının (T. Dicoccum, 2n=28 ) Tohumluk Miktarı ve Gübrelemeye Tepkisi. Erciyes Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimi, Yüksek Lisans Tez Projesi; 2015.
- Ötegen N. Gacer Buğdayında 15 Yıllık Mücadele Tescil Getirdi. 2022. Accessed 07 Nov 2022.
- Türk Patent2. Develi Gaceri, Coğrafi İşaret Sicil Belgesi. 2022. Accessed 05 Mar 2022.
- Türk Patent3. Elazığ Menceki Buğdayı, Coğrafi İşaret Sicil Belgesi. 2022. Accessed 05 Mar 2022.
- Fırat. Elazığ Menceki Bulguru Revaçta. 2022. Accessed 05 Mar 2022.
- Karapınar M. Elazığ Menceki Buğdayına Talep, Her Geçen Gün Artıyor. 2022. Accessed 10 Nov 2022.
- Türk Patent 4. İhsangazi Ekşili Pilavı, Coğrafi İşaret Sicil Belgesi. 2022. Accessed 07 Nov 2022.
- Oğuz MÖ, Aykanat N, Karagöz A. Kentler ve İmgesel Yemekler 2. Gazi Üniversitesi THBMER Yayınları, Ankara; 2006. ISBN-975-507-152-0.
- Gürsoy, D. Yöresel Mutfağımız Kuzeyden Güneye.... Doğudan Batıya. Oğlak Yayıncılık, İstanbul; 2005
- Sarı E. Kurşunlu Mutfak Kültüründe Keşkek: Geçmiş, Bugünü ve Yarını. Milli Folklor. 2011;23(90):185–194.
- Çekiç İ. Geçmişten Günümüze Törensel Bir Yemek: Keşkek (Yayımlanmamış Yüksek Lisans Tezi) Gaziantep: Gaziantep Üniversitesi; 2015.
- Akçay Z. 17. Yüzyıl Divanlarında Et ve Et Yemekleri. Uluslararası Dil, Edebiyat Ve Halkbilimi Araştırmaları Dergisi. 2017;5(10):203–217.
- Akbaba A, Ve Çetinkaya N. Gastronomi ve Yiyecek Tarihi. Ankara: Detay Yayıncılık; 2018.
- Türkiye Kültür Portalı. Geleneksel Mutfak. 2022. Accessed 24 Nov 2022.
- Elazığ İl Kültür ve Turizm Müdürlüğü. Elazığ Mutfakı, Kitabı, Mutfak Kültürü ve Yöresel Yemekler 1.2. Cilt. 2022.
- Kılıç H, Hatipoğlu A, Şahin M. Bread wheat quality approaches based on human health. Muş Alparslan Univ J Res. 2021;9(1):857–70.
- McDonnell E. Miracle foods: Quinoa, curative metaphors, and the depoliticization of global hunger politics. Gastronomica. 2015;15(4):70–85.
- Işık F, Keser A. Effects of einkorn wheat on health. J Contin Med Educ. 2020;29(4):299–304.
- Koyuncu, M. Screening Of durum wheat landraces for selected traits associated with pasta quality. Gaziosmanpaşa University Graduate School of Natural and Applied Sciences Department of Food Engineering. Master's Thesis. 2009.
- Kastamonu Valiliği İl Gıda Tarım Ve Hayvancılık Müdürlüğü. Siyez Buğdayı ve Ürünleri. 2016. Access Link: Tarimorman.Gov.Tr. Accessed 24 Nov 2022.
- Tekdal S. Evaluation of some durum wheat varieties, landraces and lines for grain and bulgur quality in southeastern Anatolian region. Department of Field Crops Institute of Natural and Applied Sciences University of Dicle. Doctoral Dissertation, Diyarbakır. (2015).
- National Food Composition Database. Buğday, Ekmeklik. Veri Bankası, Buğday, Ekmeklik. 2022.
- Türkom Ulusal Gıda Kompozisyon Veri Tabanı (Turkomp.Gov.Tr ). Accessed 18 Nov 2022.
- Türk Patent 5. Kastamonu Siyez Buğdayı. Coğrafi İşaret Sicil Belgesi. 2022.
- Loje H, Moller B, Lausten AM, Hansen A. Chemical Composition, functional properties and sensory profiling of einkorn (*Triticum Monococcum* L.). J Cereal Sci. 2003;37:231–40.
- Atalan-Helicke N. You can never give up Siyez if you taste it once: local taste, global markets, and the conservation of einkorn, an ancient wheat. Gastronomica. 2018;18(2):33–45.
- Çetiner B. Bazı Ekmeklik Buğday Çeşitlerinin Fonksiyonel ve Tam Buğday Ekmeği Özelliklerinin Karşılaştırılması, Kalite Ve Fonksiyonel Özellikler Bakımından İyileştirilme Olanaklarının Araştırılması. Hacettepe Üniversitesi, Gıda Mühendisliği Anabilim Dalı, Yayımlanmış Doktora Tezi. 2020.
- Enes A, Ünsal NE, Ünsal AS. Determination of important parameters affecting the yield and quality of durum wheat varieties in dry conditions. ISPEC J Agric Sci. 2021;5(1):246–56.
- Zaharieva M, Monneveux P. Cultivated einkorn wheat (*Triticum monococcum* L. subsp. *monococcum*): the long life of a founder crop of agriculture. Genet Resour Crop Evol. 2014;61(3):677–770.
- Borneo R, Leon AE. Whole grain cereals: functional components and health benefits. Food Function. 2012;3:110–9.
- Şanal T. Bazı Yerel Buğday Çeşitlerinin Kalite Parametreleri. Türkiye TohumcularBirliği Dergisi. 2017;24:27–31.

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