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Geographically Indication Ancestral Seed Ardahan Kavılca Wheat: A Comprehensive Review

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ABSTRACT

The focus on ancestral seeds and Geographical Indications (GI) reflects a growing global movement to reconnect with traditional agricultural practices and cultural heritage. These practices emphasise environmental sustainability, agricultural biodiversity and food quality. Kavılca, an old emmer wheat variety from Ardahan, Türkiye, exemplifies these practices. Known for its resilience to harsh climates, low gluten content and rich nutrient profile, Kavılca wheat supports sustainable agriculture and preserves cultural traditions. By protecting these unique products, GIs help preserve agricultural biodiversity and heritage against modern monoculture practices. Similarly, ancestral seeds such as Kavılca wheat offer climate change adaptation advantages with minimal dependence on chemical inputs. They also provide superior nutritional benefits, making them a healthier alternative to modern wheat varieties. Overall, the cultivation of ancestral seeds such as Kavılca wheat is crucial in addressing challenges such as climate change, food security and biodiversity loss. These practices represent a harmonious blend of tradition and innovation that promotes sustainable and culturally rich food systems for future generations. The resilience of this crop to environmental challenges, combined with its nutritional benefits and cultural significance, make it an invaluable asset in addressing the modern agricultural and food challenges we face. This review article is designed by narrative review method. It analyses the importance of Ardahan Kavılca wheat, a Geographical Indication ancestral seed, and its journey from the field to the consumer.

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Introduction

In the contemporary era, there is an increasing focus on reconnecting with cultural heritage, particularly through the utilisation of Geographical Indications (GI) within the food supply chain. This approach highlights the significant interconnection between food production and the geographical, cultural, and traditional contexts from which it originates (Arfini et al., 2019). This paradigm is frequently characterised as a "back to the roots" movement, yet its scope extends beyond the mere production and consumption of food. It encompasses broader objectives, including the preservation of environmental integrity, the safeguarding of cultural heritage, and the assurance of superior food quality (Bérard & Marchenay, 2008).

A significant proportion of GI-designated products are firmly embedded in traditional agricultural practices, culinary expertise, and artisanal processing methods that have been transmitted across generations. Such methods are frequently aligned with environmentally sustainable principles and are finely adapted to local ecosystems (Vandecandelaere et al., 2021). The resurgence of interest in traditional products signifies a revitalisation of indigenous agricultural breeds and regional crop varieties, many of which have co-evolved with specific environmental conditions over centuries (WIPO, 2024).

This dynamic not only reinforces the preservation of agricultural biodiversity but also addresses the growing necessity of promoting resilience in the face of climate change (Coşkun, 2023). The production processes associated with GI products frequently prioritise sustainability, employing techniques that demonstrate respect for the local environmental context. A considerable number of GI producers have adopted practices that are following ecological principles, including traditional farming methods such as crop rotation, the minimisation of chemical inputs, and organic cultivation. Such practices not only enhance environmental sustainability but also contribute significantly to the economic vitality of rural areas. The production of GI-certified products has been demonstrated to foster the creation of local employment opportunities and stimulate economic activity, often

serving as a cornerstone of rural development (Halder et al., 2024).

Moreover, GI products exemplify the intrinsic connection between geography and gastronomy. The distinctive characteristics of these products—flavor, texture, and nutritional quality—are inextricably linked to the unique interplay of local soil, climate, and traditional production methods. Such geographical specificity serves to enhance the organoleptic properties of the food in question, while simultaneously solidifying its cultural and economic significance (Nihei, 2019). By establishing a connection between production and specific regions, GI products serve as a crucial economic resource for local communities, frequently reducing the appeal of urban migration by maintaining livelihoods in rural settings (Van Caenegem & Cleary, 2017).

In light of the aforementioned factors, the adoption and promotion of Geographical Indications represents a multidimensional strategy that intertwines cultural preservation, environmental sustainability, and economic development. These initiatives are of great importance for the fostering of an appreciation of regional heritage, the ensuring of the viability of traditional practices, and the addressing of contemporary global challenges such as climate change and food security.

In this context, the aim is to support the promotion and better understanding of this value, given that the GI 'Ardahan Kavılca Wheat' has not yet received the attention it deserves and is only partially covered in the literature.

Geographical Indication

Geographical indications (GIs) are signs used on products that have a specific geographical origin and possess qualities or a reputation due to that origin (WIPO, 2024). They serve to identify goods as originating from a particular place, thereby highlighting the unique characteristics that are attributable to that region. Geographical indications (GIs) are signs used on products that have a specific geographical origin and possess qualities or a reputation due to that origin (Calboli, 2015). They serve to identify goods as originating from a particular place, thereby highlighting the unique characteristics that are attributable to that region. Historically, this linkage was often associated with the term 'terroir', which refers to the influence of a region's soil, climate, and other environmental factors on a product's qualities (OriGIn, 2024). As global trade expanded over time, the necessity to safeguard these distinctive regional products became apparent, giving rise to the formulation of legal frameworks for GIs.

The first international agreement to address the protection of GIs was the Paris Convention for the Protection of Industrial Property, which was signed in 1883. Subsequently, the Lisbon Agreement for the Protection of Appellations of Origin and their International Registration, established in 1958, provided a means of obtaining international protection for GIs (WIPO, 2024). Furthermore, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), which came into effect in 1995, reinforced GI protection by defining them and setting out the obligations of member states to protect them (Agdommar, 2008). A geographical indication is not merely a name or sign; rather, it represents the intrinsic connection between a product and its place of origin. This link may be based on certain qualities, reputation, or other characteristics that can be attributed primarily to geographical origin (Gangjee, 2017). To illustrate, the wheat cultivated in Kavılca, situated within the Ardahan province of Eastern Anatolia in Türkiye, is renowned for its distinctive attributes, which are attributable to the heterogeneous climatic and soil conditions prevailing in the region. It is crucial to differentiate between geographical indications and trademarks (Coombe, 2014). While both serve the function of identifying the source of goods, trademarks are distinctive signs used by businesses to identify and distinguish their products or services from those of other entities. In contrast, geographical indications are specifically designed to indicate the geographical origin of a product and the unique qualities associated with that origin (Blakeney, 2014). Geographical indication (Table 1) has different features and benefits (Calboli, 2021; Cardoso et al, 2022; Li et al, 2024; WIPO, 2024).

Ancestral Wheats

Ancestral wheat varieties, including emmer (*Triticum dicoccum*), einkorn (*Triticum monococcum*) and Khorasan (*Triticum turgidum* ssp.), represent some of the oldest cultivated grains, with a history spanning over 10,000 years (Sertse et al, 2023; C&GA, 2024). Such grains are frequently designated as "ancestral" or "heritage" varieties, and they diverge considerably from modern wheat in both genetic composition and cultivation practices. Ancestral wheat has a rich cultural history and is deeply embedded in the agricultural traditions of numerous regions, including Anatolia, the place of its origin (Athinaiou et al, 2022; Onur & Ceylan, 2023).

Table 1. Benefits and Features of Geographical Indication (GI)

Features	Benefits
Origin-linked Quality	Ensures products are authentic and high-quality.
Cultural Preservation	Protects traditional methods and local heritage.
Economic Growth	Enhances local economies and supports regional development.
Product Differentiation	Distinguishes products in global markets, adding value.
Sustainability	Promotes environmentally sustainable farming and production.
Legal Protection	Secures exclusive rights and prevents imitation or misuse.
Tourism Promotion	Boosts tourism by attracting interest to local specialties.
Consumer Trust	Builds consumer confidence in authenticity and quality.

*Source: created by the corresponding author

General Characteristics of Ancestral Wheats

It is generally accepted that ancestral wheat varieties offer a superior nutritional profile to modern wheat. This is evidenced by their higher protein levels, fibre content and essential mineral composition, including magnesium and zinc. Additionally, they are less likely to induce gluten sensitivities, as their gluten structure differs from modern hybridised wheat (Shi & Ling, 2018). These ancient grains have retained a considerable degree of genetic diversity, which endows them with the capacity to adapt to a range of climatic conditions and to withstand infestation by pests and pathogens. In contrast to modern wheat, which has been bred for uniformity and large-scale production, ancestral wheat displays greater resilience to environmental stresses, including drought and poor soil conditions (Wang et al, 2024). Many chefs and bakers are attracted to ancestral wheat due to its distinctive flavor profile. The flavor of these grains is more pronounced and robust than that of modern wheat, which has been bred for mass consumption and is therefore characterised by a neutral flavor profile. For example, einkorn has a slightly nutty taste, whereas emmer offers a rich, rustic flavor (Hastorf & Bruno, 2020; Doğan & Keserli, 2024). The cultivation of ancestral wheat contributes to the maintenance of agricultural biodiversity and the sustainability of agricultural practices. As these crops flourish in suboptimal growing conditions, they provide support to small-scale and local farmers who frequently employ low-input agricultural practices. This is in stark contrast to the vast monoculture fields of modern wheat, which rely heavily on chemical fertilisers and pesticides (Pérez-Lloréns & Brun, 2023). In Türkiye, for example, ancestral wheat varieties such as Kavılca have constituted an integral part of local diets for centuries (Mısır & Alp Baltakesmez, 2024). These grains are not only a staple food but also represent cultural heritage. In recent times, many regions have begun to recognise the importance of preserving these ancient varieties to safeguard both their agricultural heritage and food sovereignty (Demir, 2020; Aydar, 2022). The growing interest in these ancestral grains reflects a broader movement towards sustainable and organic farming practices (Uralçin, 2024). In light of mounting concerns regarding the environmental impact of contemporary agricultural practices, there has been a growing recognition of the ecological benefits, nutritional value, and cultural significance of ancestral wheat (Ríos & Palmera, 2024). In recent years, there has been a notable resurgence in the utilisation of ancestral seeds. To safeguard these ancient grains from extinction, movements such as seed-saving initiatives and community seed banks have been established. A collaborative effort between scientists, indigenous communities, and farmers is underway to reintegrate these crops into mainstream agricultural practices (Aydar, 2022). This resurgence in interest in ancestral wheat is aligned with the Slow Food movement and efforts to combat the loss of biodiversity caused by modern agricultural practices (Slow Food, 2024). The resurgence of ancestral wheat varieties signifies not only a return to traditional agricultural practices but also an endeavor to confront global challenges such as climate change and food security. These grains, with their long historical precedent, are being acknowledged as essential instruments for the future of sustainable agriculture (Sanchez-Garcia, & Bentley, 2019).

Importance of Ancestral Seeds

Ancestral seeds play an important role in environmental sustainability. These non-genetically modified seeds can be produced naturally by adapting to local climate and soil conditions (Mısır & Alp Baltakesmez, 2024). Unlike the uniform seeds used in modern agriculture, traditional seeds support agricultural diversity. Ancestral seeds, which do not require chemical pesticides and fertilisers, promote environmentally friendly agricultural practices (Seçer & Boğa, 2016). Products derived from ancestral seeds tend to have higher nutritional value and are important for healthy food production. For these reasons, studies on ancestral seeds in Türkiye are considered critical for protecting cultural heritage and supporting sustainable agricultural practices (Onur & Ceylan, 2023).

Compared to modern bread wheat (*Triticum aestivum*), ancestral wheats are nutritionally dense, with higher levels of protein, essential amino acids, and micronutrients such as magnesium, zinc, and selenium. They also contain high amounts of dietary fiber and bioactive compounds like carotenoids and polyphenols, which are associated with antioxidant properties (Hidalgo & Brandolini, 2014). However, their gluten content is lower, which, while unsuitable for celiac patients, makes them more tolerable for individuals with gluten sensitivity.

Traditional foods made from ancestral wheats include flatbreads, porridges, and pilafs, which remain staples in various cultures. The revival of these grains aligns with a global movement to reconnect with traditional diets and artisanal food production, as they are perceived to offer superior flavor and texture compared to their modern counterparts (Nash, 2023).

Ancestral wheats contribute to agricultural biodiversity and are essential for preserving the genetic resources needed to breed future wheat varieties with improved resilience to climate change. Their cultivation supports sustainable farming practices by reducing dependency on chemical inputs and promoting soil health through crop rotation (Aloisi et al., 2023).

Ancestral Seed Studies in Türkiye

Studies on ancestral seeds and wheat varieties in Türkiye are of great importance for the protection of agricultural heritage and the promotion of sustainable agricultural practices. Ancestral seeds are seeds that are adapted to local conditions, are not genetically modified and are grown using traditional methods (Altıkat et al., 2018). These seeds differ from modern hybrid seeds, which are generally used in industrial agriculture because they can be grown in natural cycles without the need for chemical intervention. Türkiye is a country with great agricultural biodiversity. Due to different climatic and soil conditions, there are many local seed varieties, especially in staple crops such as wheat. However, the widespread use of modern agricultural techniques has reduced the use of these local seeds over time, so the protection of traditional seeds and local varieties has become an important agenda (Latief & Zhang, 2023). Wheat varieties in Türkiye, especially in rural areas, have evolved naturally over thousands of years and are best adapted to the conditions of the region (Araus et al., 2007; Aksoy et al,. 2017). The most common wheat varieties grown in Türkiye are

Karakılçık wheat one of the best-known ancient varieties, has high nutritional value and low glycaemic index. Yellow wheat is mainly grown in Central Anatolia, this variety is resistant to dry conditions and is known for its hard structure. Siyez wheat, which has a history of around 10,000 years, is a wheat variety ground in stone mills (Çakır & Arıcı, 2023). It is grown mainly in the Kastamonu region. Kavılca wheat, which has a history of about 10,000 years, is grown mainly in the Ardahan region (Karagöz, 2014; Anatolia Foundation, 2024).

The following academic studies on Kavılca are worthy of note: in their study, In his master's thesis, Aydar (2022) sought to compare *Triticum dicoccum* wheat, the ancestral seed of the Kars region and also known as 'kavılca' wheat, with modern wheat Triticum aestivum in terms of quality criteria and health effects, to determine the potential of kavılca wheat as an ingredient in the food industry. In his master's thesis, Uralçin (2024) obtained biochar (a carbonaceous product) from 'kavılca' (*Triticum dicoccum Schrank*) shells by hydrothermal pyrolysis at temperatures of 130, 200, and 230°C. He then investigated the capacities of these biochars and activated carbon obtained from a suitable biochar. Consequently, a total of eight biochars were produced from the Kavılca raw material. Of these, six underwent activation, resulting in the production of activated carbon from the most efficient biochar. The objective of the study conducted by Mısır & Alp Baltakesmez (2024) was to ascertain the textural and sensory characteristics of pasta produced with varying proportions of kavılca flour. The findings of the study indicated that pastas produced with 50% and 60% kavılca flour were perceived as the most optimal in terms of texture and sensory attributes. In their study, Aslan Türk et al. (2024) compared the nutritional values and physical properties of crackers produced from Kavılca and other whole wheat flours. The study showed that Kavılca was superior to other varieties in terms of fibre ratio and protein values.

In recent years, various institutions and local administrations in Türkiye have initiated projects related to ancestral seeds. The General Directorate of Agricultural Enterprises plays an important role in the conservation of ancestral seeds in Türkiye. It carries out studies on the conservation of local seeds in gene banks and their reintroduction into agriculture (Pandır & Erol, 2024). Within the scope of Kavılca activities, an organisation was organised in Ardahan under the name of 'Promotion Event of Ardahan Kavılca, the Ancestor of Wheat' (2024). In this event, it was aimed to increase the awareness of Kavılca wheat at local and international level. In the event, dishes made from Kavılca wheat were introduced and the gastronomic potential of the product was emphasised (KÜSİP, 2024). Many municipalities organise local seed exchange festivals to bring ancestral seeds to farmers and initiate agricultural projects based on ancestral seeds. In 2020, the Ministry of Agriculture launched the "Local Seed Production and Research Programme" to protect and disseminate local seeds (Republic of Türkiye Ministry of Agriculture and Forestry, 2020).

Kavılca Wheat

Ardahan Kavılca wheat is a variety of the ancient seed emmer wheat (Triticum dicoccum L.) (2n=28, AABB). It is characterised by a hard husk that makes it more resistant than modern wheat varieties. The robust outer layer is beneficial in safeguarding the grain from environmental stress, pests and diseases (Lachman et al., 2012). The gluten content of Kavılca wheat is relatively low in comparison to that of modern wheat, which makes it a suitable option for consumers with gluten sensitivity. However, despite this low gluten content, it is not recommended for individuals with celiac disease. The grain's high fibre and essential amino acid content make it a nutritionally dense option for a variety of food products, including bread, pasta and bulgur. Kavılca wheat is distinguished by its health-promoting attributes. It is a rich source of dietary fibre, which plays an important role in digestive processes and the maintenance of a healthy gut microbiome (Özgören & Işık, 2023). The low gluten content of this variety makes it a suitable alternative for those seeking to reduce gluten intake. Additionally, the grain is rich in protein, iron, and antioxidants, providing essential nutrients that support overall health. It has been demonstrated that the ingestion of ancient grains such as Kavılca can assist in maintaining stable blood sugar levels and reducing the likelihood of developing chronic diseases such as diabetes and cardiovascular disease (Figure 1).

Ardahan kavılca wheat displays remarkable resilience to adverse climatic conditions, particularly the cold and brief growing seasons typical of the Ardahan region of northeastern Türkiye (Figure 2). The wheat cultivated in the Ardahan province has a long history. The geographical border plays an important role in the region's agricultural economy. Consequently, all stages of production for wheat, which is renowned for its geographical origin, are conducted at the geographical border. (Türk Patent ve Marka Kurumu, 2024).

Figure 1. Ardahan Kavılca Spike of Ancestral Wheat

Figure 2. Production Region Boundaries of Kavılca Wheat

Table 2. Kavılca Wheat from Field to Table Prepared With Traditional Methods

Steps	Description
1. Seed Selection	Farmers begin by choosing ancestral Kavılca wheat seeds, which have been passed down through generations. These seeds are valued for their resilience, biodiversity, and historical heritage.
2. Soil Preparation	The soil is prepared by local farmers in Ardahan, often without the use of synthetic fertilizers or pesticides, due to Kavılca's natural resistance to harsh climatic conditions.
3. Planting	In early spring, the seeds are planted. The wheat grows best in the cold, high-altitude climates of northeastern Türkiye, where it has adapted over millennia.
4. Cultivation	Kavılca wheat requires minimal irrigation and grows under rain-fed conditions. It is a hardy crop that can thrive in the short growing season typical of the Ardahan region.
5. Harvesting	Harvest occurs in late summer or early autumn. The grain is manually harvested, often using traditional methods passed down through generations.
6. Threshing & Processing	The wheat is threshed to remove its husk, which is harder compared to modern wheat varieties. This step often involves milling the wheat into flour, which can be used for various recipes.
7. Flour Milling	Once processed, the wheat is stone-ground into flour, which preserves its nutrient content, including high levels of fiber, protein, and vitamins.
8. Local Market Distribution	The flour is sold in local markets or directly from farms. With its growing popularity, Kavılca flour has started to gain attention beyond the region, especially among artisanal bakers.
9. Gastronomy Use	Kavılca flour is utilized in various traditional Turkish dishes, such as bread, pilaf, and bulgur. Its earthy flavor and dense texture make it popular in both home kitchens and restaurants.
10. Consumption	On the table, Kavılca wheat products are enjoyed not only for their flavor but also for their health benefits, reflecting a cultural connection to ancestral eating habits.

*Source: created by the corresponding author.

This wheat variety is an exemplar of crop adaptability, and as such, represents a crucial component of sustainable agricultural practices. The capacity of this wheat variety to flourish in such challenging conditions, without the need for excessive irrigation or chemical inputs, underscores its potential contribution to climate-resilient agriculture (Ilhan, 2021). Farmers who cultivate Kavılca wheat enjoy the benefits of sustainability, as the crop necessitates a reduced reliance on pesticides and herbicides, following environmentally conscious agricultural methodologies (Table 2). Kavılca wheat is a notable ingredient in the culinary arts, distinguished by its rich, earthy flavor and dense texture (Gallop, 2022). These qualities render it a highly sought-after ingredient in traditional Turkish dishes, including bulgur, pilaf and bread. Additionally, it aligns with the broader global movement of reintroducing these grains into contemporary gastronomy, where chefs and home cooks are combining traditional ingredients for their distinctive flavors and nutritional benefits. Wheat's low gluten content and distinctive flavor profile permit bakers to produce hearty and palatable baked goods. Due to its low gluten content, the flour produced from Kavılca wheat is subjected to a series of blending processes during the manufacturing process (Mısır & Alp Baltakesmez, 2024). This is done to optimise the utilisation of the product in terms of its flavor profile and texture. From a socio-cultural perspective, Ardahan Kavılca wheat plays an invaluable role in the preservation of local traditions and agricultural heritage (Mısır & Alp Baltakesmez, 2024). Kavılca wheat, which has been cultivated by the same families for generations, is not only a fundamental component of the regional diet in Ardahan but also a symbol of the region's cultural identity. The recent resurgence of interest in ancient seeds such as Kavılca wheat is part of a broader global movement to reconnect with traditional foodways. This movement underscores the significance of

biodiversity conservation and the maintenance of food sovereignty, particularly in rural communities where agriculture is a central aspect of the way of life (Demeulenaere, 2014). The designation of Ardahan Kavılca wheat as a Geographical Indication (GI) serves to reinforce its socio-cultural significance by safeguarding it from commercial exploitation and ensuring that its production remains closely aligned with the region. The legal protection afforded by GI status helps to maintain local agricultural practices and strengthens the economic potential of small farmers, ensuring that these communities can continue to benefit from traditional farming methods (Rangnekar, 2004). This multifaceted perspective on Ardahan Kavılca wheat underscores its significance not only as a crop but also as a pivotal element in diverse domains, including health, agriculture, gastronomy, and cultural heritage (Berkes et al., 2000). The resilience of this crop to environmental challenges, coupled with its nutritional benefits and cultural significance, renders it an invaluable asset in addressing the modern agricultural and food issues that we face.

Conclusion

Ardahan Kavılca wheat, a variety of the ancient emmer wheat (*Triticum dicoccum L.*), is an invaluable crop with a rich history and cultural heritage. This wheat is characterised by a hard husk, low gluten content and high nutritional value, including increased levels of fibre, protein, iron and antioxidants. Cultivated in the cold, high-altitude Ardahan region of north-eastern Türkiye, Kavılca wheat shows remarkable resilience to harsh climatic conditions and requires minimal irrigation and chemical inputs. These attributes position it as a model for sustainable and climate-resilient agriculture.

In addition to its agricultural benefits, Kavılca wheat has significant culinary and health benefits. It is used in traditional Turkish dishes such as bread, bulgur and pilaf, and is valued for its earthy flavor and dense texture. Its low gluten content makes it suitable for those reducing gluten in their diet, although it is not recommended for those with celiac disease. In addition, its consumption supports gut health, stabilises blood sugar levels and may reduce the risk of chronic diseases such as diabetes and cardiovascular disease.

Kavılca wheat's Geographical Indication (GI) status highlights its socio-cultural importance, protects it from commercial exploitation and supports traditional farming practices. This recognition promotes food sovereignty, preserves biodiversity and sustains the livelihoods of local farmers. The resurgence of interest in ancient grains underscores their relevance in addressing modern agricultural, health and cultural challenges. Ardahan Kavılca wheat is a testament to the enduring value of traditional crops in modern food systems. Promoting and preserving Kavılca wheat to a wider audience is critical not only for regional development but also for the conservation of agricultural biodiversity and environmental sustainability. Increasing academic research on Kavılca wheat will provide a better understanding of the agricultural, nutritional and industrial potential of this crop. Effective promotion of the registration of Kavılca wheat as a geographical indication at national and international levels can increase the market value of the product. Promotion of Kavılca wheat products (e.g. pasta, bread and flour) in different market segments can contribute to the region's economic growth. Training farmers to cultivate Kavılca wheat could encourage local communities to adopt the crop. Events highlighting the gastronomic potential of Kavılca wheat can support regional tourism. Ardahan Kavılca wheat should be seen not only as a heritage of the past but also as an asset that can play an important role in the sustainable agricultural practices and healthy food strategies of the future. Multifaceted approaches to the conservation and promotion of wheat can contribute to the region's development and environmental sustainability.

Declaration

The authors declare no conflict of interest in this paper.

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