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Wheat Landraces, Small Farmers and Urban Consumers: Revival of Einkorn in Turkey

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Abstract

Cultivated for more than 10,000 years, wheat (*Triticum*) is one of the world's most widely grown and important crops. Wheat has sustained humans for thousands of years in a multitude of ways. In recent years, there has been a global movement to revive wheat landraces. Landraces are typically adapted to a local area and to traditional farming systems. This article examines the revival of wheat landrace, einkorn (*Triticum monoccoccum L. subsp. monoccoccum*) through a case study of Turkey. There is limited literature examining the interaction of actors in decision-making processes that balance subsistence and market motivations. The article examines the role of collective action to revive agricultural biodiversity, and it contributes to interdisciplinary studies on sustainable management of agricultural biodiversity.

Resumen

Cultivado desde hace más de 10.000 años, el trigo (*Triticum*) es uno de los cultivos más importantes y de mayor producción en el mundo. El trigo ha sustentado a los humanos durante miles de años de muchas maneras. En los últimos años, existe un movimiento global para revivir las variedades tradicionales de trigo. Las variedades tradicionales suelen estar adaptadas a una zona local y a sistemas agrícolas tradicionales. Este artículo examina la revitalización de la variedad tradicional de trigo, el einkorn (*Triticum monoccoccum L. subsp. Monoccoccum*), a través de un estudio de caso de Turquía. Existe poca literatura que examine la interacción de los actores en los procesos de toma de decisiones que equilibran las motivaciones de subsistencia y de mercado. El artículo examina el papel de la acción colectiva en revivir la biodiversidad agrícola y contribuye a estudios interdisciplinarios sobre la gestión sostenible de la biodiversidad agrícola.

Keywords

Wheat, landraces, conservation, einkorn, small farmers, nutrition

Introduction

Cultivated for more than 10,000 years, wheat (*Triticum*) is one of the world's most widely grown and important crops. A hardy crop, it can adapt to a range of agro-ecological conditions (Erenstein et al., 2022). Wheat's extraordinary yields, long storage periods, and its flour's astonishing chemical reaction with water and yeast have facilitated adoption of wheat across continents and cultures: Today, it provides 18% of all global human calories and 19% of proteins consumed (Erenstein et al., 2022).

Agricultural policies and seed governance structures emerging in the twentieth century have been hostile to landraces. Modern production systems and globalized supply chains have pressured farmers to grow fewer crops and fewer varieties of each, facilitating debates about loss of crop diversity and genetic erosion (Montenegro de Wit, 2016). Wheat landraces refer to a dynamic population of cultivated wheat managed by farmers through cultivation, selection, and diffusion; landraces are typically adapted to a local area and to traditional farming systems. Wheat landraces have a historical origin and distinct identity and lack formal crop improvement. Today, the production of wheat landraces has been pushed to marginal areas of the Mediterranean region, Southern Europe, and North and East Africa (Giuliani et al., 2009). Wheat landraces persist at higher elevations, in marginal and dry land where high-yielding wheat varieties have not performed well. Small farmers in these areas have livestock and often prefer the long stems of landraces, especially their kernels, as feed for livestock. Small farmers in such marginal areas cultivate small, fragmented plots and do not have resources to invest in high-yielding wheat seeds or the inputs these wheat varieties need. Moreover, the wheat varieties that are the outcome of scientific research may not fully address the needs or expectations of traditional farmers (Karagöz, 2014).

Debates on industrial and global agriculture's growing ecological footprint and climate change demonstrate the need for innovative and cost-effective ways to address food security. Growing landraces can serve multiple goals, including sustaining soil health, maintaining traditional knowledge and culture, offering income and livelihood opportunities, and contributing to health and nutrition (Tutwiler, 2016). Wheat landraces can play a role in food security due to their resilience in marginal areas and role in livestock operations for small farmers and traditional diets (Migliorini et al., 2016). Having evolved under more marginal conditions, wheat landraces can also provide high yield stability and intermediate yield levels in low input agricultural areas (Jaradat, 2013). Suitable for organic agriculture, landraces can provide relatively high income compared to high-yielding wheat varieties as they can be primarily used for the production of whole grain products for niche markets (Kaplan Evlice et al., 2022). Climate change is relevant in debates about conservation of wheat landraces as small farmers rely on agricultural biodiversity to adapt: They may prefer early-maturing or drought-tolerant varieties and incorporate neglected and underutilized crops in their product portfolio to increase resilience (Meldrum et al., 2013). There is growing consumer interest in agricultural biodiversity: Wheat landraces often have higher desirable nutritional values, such as higher minerals and phenolic compounds. These properties are associated with increased antioxidants, which can help delay or prevent chronic diseases (Dinelli et al., 2011). Agricultural biodiversity is also critical for the well-being and livelihoods of small farmers: Landraces meet the social, economic, cultural and environmental needs of small farmer households and their communities (Jaradat, 2013).

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Literature has focused on the loss of crop diversity and genetic erosion. By 2020, almost 400 articles were published with genetic erosion in their titles (Khoury et al., 2022). However, narratives about loss of seeds help legitimize a particular strategy of seed conservation without addressing the drivers of loss. Thus, there are calls for a more multidimensional view of agricultural biodiversity to understand how diversity is created, maintained, and renewed particularly by small farmers on their farms (Montenegro de Wit, 2016). Recent studies have examined farmers' contribution to sustainable use and dynamic management of agricultural biodiversity from the North and the South (Batur et al., 2021; Maas et al., 2021; Kopytko, 2019, Joshi & Upadhya, 2019). Studies also refer to the complexity of on-farm conservation: Different social actors have different wants and capacities in relation to biodiversity conservation, and their choices affect future decisions of conservation (Bellon et al., 2015). However, there is limited literature examining the interaction of actors in decision-making processes that balance subsistence and market motivations, and sustainable management of agricultural biodiversity. Studying cultivated diversity using a multi-actor lens is relevant to fostering sustainable organic food systems and agro-ecological transitions (Chable et al., 2020). This paper addresses that gap. By examining wheat landrace cultivation through a multi-actor lens, it contributes to interdisciplinary studies on sustainable management of agricultural biodiversity.

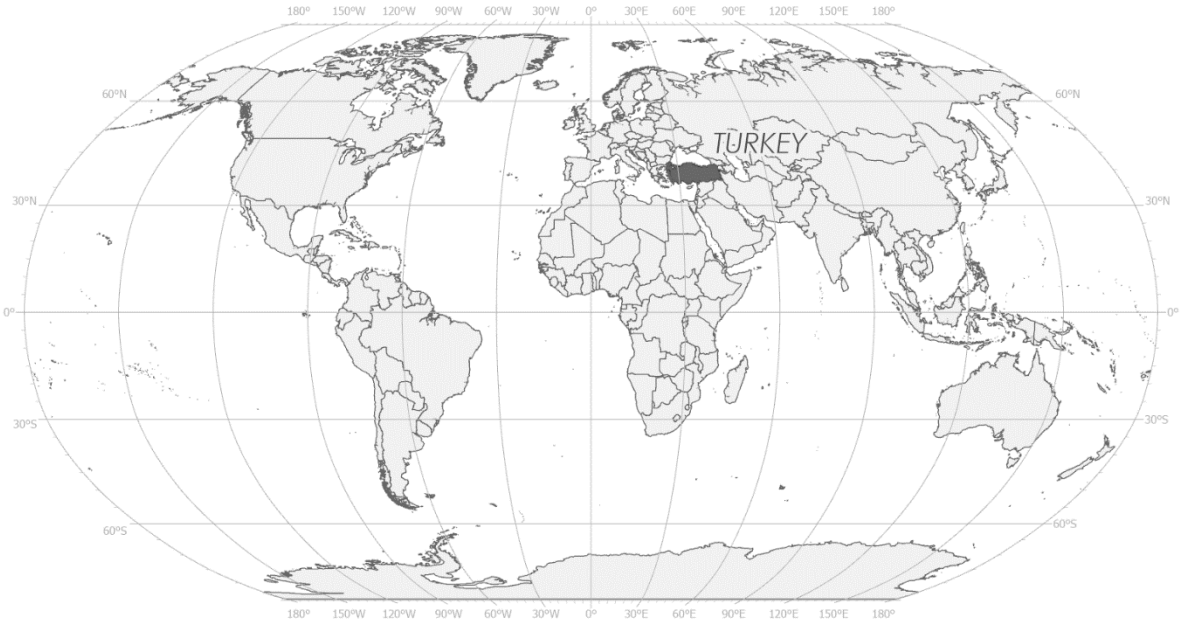
This paper examines the motivations of actors involved in the revival and conservation of wheat landraces in Turkey, a center of agricultural domestication and diversity of wheat, and their initiatives (See Figure 1). Contrary to the claims of full-blown genetic erosion, wheat diversity and wheat landraces exist in farmers' fields in Turkey. Although cultivated in about one percent of total land devoted to wheat cultivation in Turkey, custodian farmers in marginal areas have maintained traditional knowledge of breeding and processing of wheat landraces (Kan et al., 2015). Through two case studies of an ancient wheat, einkorn (*Triticum monoccoccum L. subsp. monoccoccum*), this paper discusses the transformation of a neglected and underutilized crop from only known in local markets to a health food in the supermarket shelves, restaurant menus, and baker shops. This transformation took the interventions of multiple actors at local, regional, and national scales over several years. The paper further considers the role of individual and collective action by a multitude of actors in the wheat landrace value chain that have ensured access to high quality seeds, promoted the taste of this landrace among urban consumers, created innovative value-added products, and financed the production and marketing of einkorn. This paper argues that while the motivations of these actors are diverse, their actions complement each other and provide room for dialogue and collaborations. Moreover, the collective efforts of actors for revitalization of landraces have helped consumers reacquire taste for the landraces. As the case studies demonstrate, the connections among small farmers engaged in landrace cultivation and with actors that aim to revive landraces can take multiple forms and be sustained in the long run. These efforts further support sustainable development goals: a healthy environment; livelihoods of small farmers; and well-being of both urban and rural communities.

Methods and Research Questions

Three questions guide this research: What are the motivations of actors that support conservation, marketing, and management of wheat landraces? What kind of interventions do actors engage along the wheat value chain to "revive" wheat landraces? What kind of challenges do actors face in the conservation, marketing, and management of wheat landraces? Data for this paper comes from a multi-sited ethnography "following" wheat as an object and the actors along

the wheat landrace value chain in Turkey. Multi-sited ethnography ties actors from different backgrounds together because of a common problem of interest (van Dujin, 2020), in this case, their role and motivations in the production, processing, distribution, and marketing of wheat landraces.

Figure 1: Map of Turkey



The data comes from multiple field trips carried out between 2007 and 2022 in Turkey, each ranging from four weeks to four months. To ensure diversity in the sampling, the research aimed to gather perspectives mostly from five main sub-populations: (1) farmers, (2) local non-profits, (3) international organizations, (4) the private sector, and (5) the government. In 2007, wheat landraces were known only regionally with their local names, and national markets for wheat landraces did not exist (Atalan Helicke, 2018). Initial field work locations were chosen in consultation with state officials and plant breeders with two locations focusing on two landraces: einkorn (locally known as *siyez* in Kastamonu) and a bread wheat variety (locally known as *zerun* in Sivas).[1] At each location, after further consultation with local state officials and elected local government representatives, villages to be visited were determined. The data collection involved semi-structured interviews, household surveys and participant observation (See Table 1). Data was collected through snowball sampling: Farmers named other actors along the wheat

[1] In 2007, there was limited published data on wheat landraces in Turkey: A national wheat landrace survey was published in 1938 (in Turkish), with a more recent national survey was completed in 2014 (in English). More research has been published about Kastamonu siyez and Bolu IZA in the last five years. After the marketing of Kastamonu siyez at national markets, there was a growing interest among various actors to revive their local wheat landraces. By the end of 2022, the author completed research about nine different wheat landraces reaching regional and national markets in Turkey.

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landrace value chain, different farmers, farmer-traders or processors in nearby villages or non-profit organizations and business they work with.

Table 1: Multi-sited Ethnography in Turkey from 2007 to 2022

Year	Locations of field trip in Turkey (cities and villages)	Methods	Stakeholders reached
2007	Ankara, Izmir, Eskisehir, Kastamonu	Semi-structured interviews, participant observation	18 state officials, 1 plant breeder, Representatives of 7 international organizations and 15 non-profits, 4 business owners, 1 academician
2009	Ankara, Kastamonu, Sivas	Semi-structured interviews, participant observation, household surveys	40 men farmers, 16 women farmers, 3 traders, 1 business owner
2014	Ankara, Kastamonu	Semi-structured interviews	10 men farmers, 3 farmer-traders,3 non-profit representatives, 1 academician
2018	Ankara, Bolu, Istanbul	Semi-structured interviews, participant observation	3 academicians, 3 municipality representatives, 3 artisan bakers
2019	Ankara, Istanbul, Amasya, Balıkesir, Çankırı, Tokat, Malatya	Semi-structured interviews, participant observation, household surveys	10 men farmers, 2 farmer-traders, 8 business owners, 1 processor-trader, 5 artisan bakers, Representatives of 4 non-profits and 4 municipalities, 1 academician
2022	Ankara, Istanbul, Bolu, Kastamonu	Semi-structured interviews, participant observation, household surveys	8 men farmers, 2 women farmers, 6 farmer traders, Representatives of 4 cooperatives, and 1 development agency, 5 local government officials, 3 academicians, 2 chefs, 2 business owners

In each interview, stakeholders provided information about their role in the wheat landrace value chain, the actors they collaborate with, their motivations, and challenges. Farmers also completed surveys about their socio-economic status, including inputs in wheat landrace cultivation, their yield, and marketing mechanisms. In 2007, the youngest farmer interviewed who was cultivating a wheat landrace was 26 years old. In 2022, the youngest farmer interviewed was 43 years old.

The age of farmers interviewed gradually increased between field trips, reflecting aging of farmers both globally (Booth, 2021) and in Turkey (Kan et al., 2015). Each farmer can be categorized as a marginalized farmer, cultivating land ranging from 30 dönüm[2] (3,000 square meters, 7.4 acres) to 400 dönüm (400,000 square meters, 98.8 acres).[3] Farmers interviewed also had livestock operations, and their livestock size ranged from 15 to 60 cows (for both dairy and beef production).

The qualitative data has been complemented by a document analysis (legal and policy documents from Turkey) and literature review. Multiple encounters with the same stakeholders over the years through visits to the same locations also allowed an opportunity to observe long-term changes in farmer livelihoods, socio-economic development at the local level, marketing of wheat landraces as well as impacts of national policies on wheat landraces.

CASE STUDY CONTEXT

Einkorn is a hulled wheat variety, which means that the kernel retains its hull or husk during harvest. It has traditionally been used for making bulgur, a traditional food.[4] Einkorn is mostly cultivated in the northwest transitional zone in Turkey along the Black Sea, in the provinces of Kastamonu and Bolu, about 1,100-1,300 meters above sea level (3,600-4,250 ft) (Zencirci et al., 2020). Agricultural areas are limited, and the mountainous terrain also makes mechanized agriculture and the cultivation of high yielding wheat varieties difficult (Yaman et al., 2020; see Figure 2).

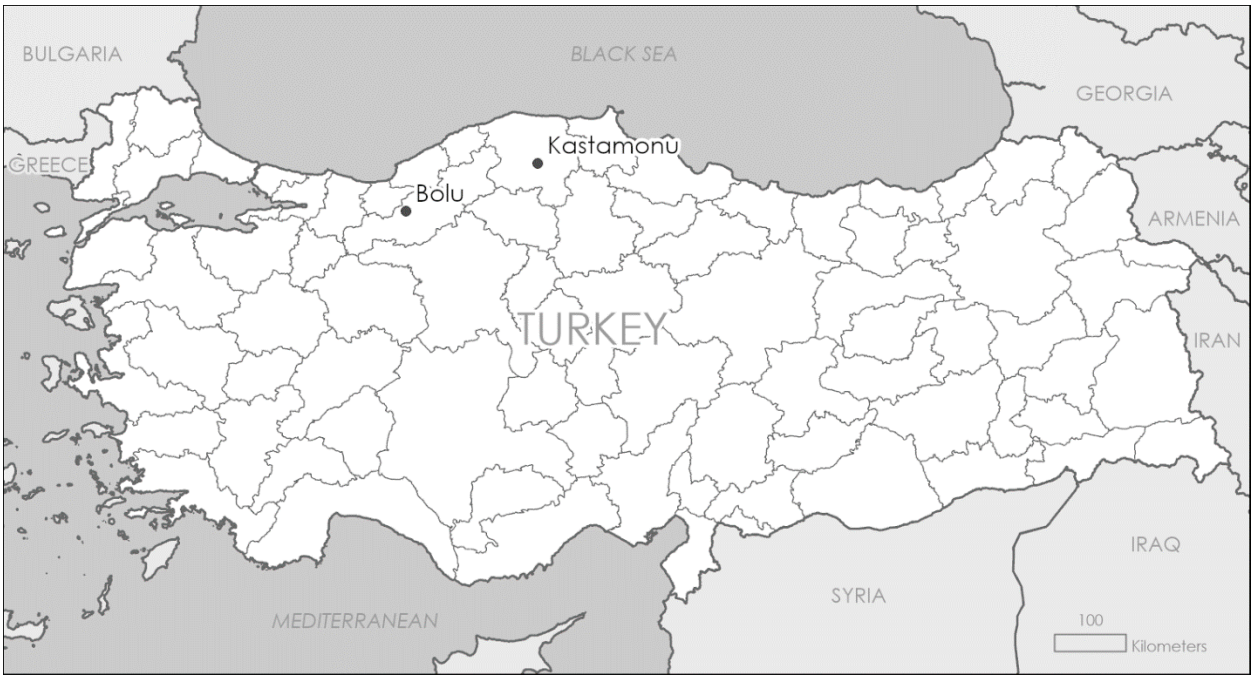
Since its establishment in 1923, the Republic of Turkey has embraced agricultural modernization policies focused on increasing wheat production and yields. The state also established research stations and facilities to breed new wheat varieties (Özberk et al., 2016). Turkey also embraced modernization associated with the Green Revolution (Gollin et al., 2021). Through collaborations with international organizations starting in the 1960s and the adoption of high yielding wheat varieties, Turkey's wheat production has increased. Reflecting these changes, einkorn production reduced significantly, and threshable bread wheat and durum wheat varieties replaced hulled wheat varieties (Lopes et al., 2015).

There are several challenges for conservation and sustainable utilization of einkorn in Turkey. First, cultivation areas have reduced in recent decades. Along with the aging of farmers, this reduction has impacted the production and availability of high-quality einkorn seeds. While small farmers continue to exchange seeds in local networks, legal changes, particularly the 2006 Seed Law and related by-laws, have disrupted seed exchange and seed trade practices (Nizam & Yenal, 2020). Second, urbanization and globalization have changed dietary preferences, reducing

[2] A dönüm is a traditional land measurement used in Turkey. One dönüm equals to about one-fourth of an acre.
[3] Indeed, Table 2 below shows that the total cultivation in Ihsangazi, Kastamonu in 2017-2018 growing season was 10,880 dönüm. With 848 farmers, this puts the average field size for siyez cultivation at 12.8 dönüm (12,800 square meters, 3.1 acres).
[4] Bulgur is one of the earliest "processed foods" on record, with evidence of consumption dating back to prehistoric times. It has been pre-cooked to minimize the leaching of valuable water-soluble nutrients, making it a highly nutritious product. It is traditionally made by boiling the wheat kernels, draining them, drying them under the sun, and then milling them to the desired size for use in soups, stuffing of vegetables, and pilafs (Stone et al., 2020).

consumption of bulgur among urban consumers (Dal, 2012). Third, changes in food marketing and wholesale laws have presented barriers for small farmers and farmer-millers to bring traditional products to markets. Fourth, einkorn has not been traditionally processed into flour, necessitating innovative practices to create value-added products with einkorn flour. Fifth, preparation of einkorn bulgur and flour requires the kernels to be dehulled. The dehulled weight is about 50 to 70 percent of the actual yield (Baker, 2015). This loss increases the cost of production. Finally, einkorn bulgur production through traditional methods is labor-intensive. In recent years, aging of farmers, shrinking of household population in rural areas, water shortages, and regulations related to open fires near forest areas[5] have prevented households from processing einkorn bulgur in traditional ways.

Figure 2: Kastamonu and Bolu Provinces in Turkey



Findings

REVIVAL OF SIYEZ

Custodian Farmers of Kastamonu

Einkorn is locally known as *siyez* in Kastamonu. A 57-year-old male farmer, Rahmi,[6] who raised cows for dairy and meat and worked together with his extended family, has grown siyez for generations in Ihsangazi, Kastamonu. Rahmi has fed siyez to his cows, since the animals

[5] In 2022, small farmers in Bolu particularly mentioned climate change affecting their livelihoods in different ways: Bolu was declared a water scarce region at least twice during the last decade, and rural households had to deal with water rationing during summer months.
[6] All names are pseudonyms.

provided “a good income.” He also operated a mill and processed his and other farmers’ siyez at his mill in return for a percentage of their processed production. His family has long valued siyez bulgur for nutrition, for cultural reasons (gifting siyez to relatives), and for their livelihoods. Like other local farmers, Rahmi saved his own seeds and shared them with his relatives or neighbors. He also learned about state subsidies and policies through other farmers through involvement in a dairy cooperative and the Agriculture Chamber.

Rahmi has been a trader. His family has made siyez bulgur with household labor. He has sold it at local and regional markets and delivered it to urban consumers in nearby cities. Initially, Rahmi faced challenges with sales: Urban consumers beyond local markets were not familiar with it. However, by 2009, he was able to sell 4 metric tons (4.4 US tons) of siyez bulgur annually at local and Istanbul markets. Since 2005, Rahmi’s family has bought new fields to cultivate and process more in response to market signals. If increasing awareness about the taste and health properties of siyez affected Rahmi’s growing business, Rahmi’s attention to quality of siyez seeds and siyez bulgur were equally important. On several occasions, Rahmi shared that his customers would buy siyez bulgur “only from [him]” and “year after year” because they could “trust the quality.”

All farmers are *de facto* conservationists of crop diversity as they select and conserve seeds, and maintain and share traditional knowledge (Brush, 1991). Yet, certain farmers stand out as they actively maintain, adapt, and disseminate agricultural biodiversity and related knowledge over time and space, on-farm and within their communities. As einkorn production has disappeared from other districts in Kastamonu since the 1960s, small farmers in Ihsangazi district have maintained siyez seeds and livestock operations using siyez as animal feed. These small farmers paid attention to the quality of seeds and traditional knowledge related to its cultivation and processing (e.g., siyez bulgur). These custodian farmers are critical to the conservation of wheat landraces and maintaining cultivation despite pressures from agricultural policies and pressures to adapt higher yielding varieties.

Siyez bulgur has always been consumed locally in Kastamonu. It was also known among those who immigrated from Kastamonu to Istanbul, Turkey’s largest city. Siyez tasted different than conventional factory-processed bulgur made with durum wheat and required a longer cooking time than what many consumers were used to. In Ihsangazi, farmers used most of their siyez (about three-fourths) as animal feed, set aside ten percent as seed, and processed the rest as siyez bulgur for household use and markets (Atalan Helicke, 2018). Over time, as the market demand for siyez bulgur increased, the market price for siyez bulgur increased (See Table 2). Over time, Ihsangazi farmers started to set aside more of their production for markets and expanded cultivation. More farmers in other districts of Kastamonu also started to grow siyez and processed it as bulgur and flour for national markets (See Table 2).

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Table 2: Total Siyez Production in Kastamonu Districts, 2017-2018 Growing Season (data from Kastamonu Directorate of Ministry of Agriculture and Forestry)

	Merkez	Ağlı	Azda-vay	Daday	Devre-kani	İhsan-gazi	Küre	Seydiler	Taşkö-prü	Total
Farmers growing siyez individually (number)	115	52	1	30	250	848	4	167	3	**1,470**
Cultivation (dönüm)	2,000	314	6	600	3,000	10,880	96	5,000	86	**21,982**
Farmers in contract farming (number)	0	18	0	0	150	0	0	333	0	**501**
Land under contract farming (dönüm)	0	530	0	0	4,000	0	0	15,000	0	**19,530**
Total number of armers growing siyez	115	70	1	30	400	848	4	500	3	**1,971**
Total cultivation of land in dönüms	2,000	844	6	600	7,000	10,880	96	20,000	86	**41,512**
Total production (metric ton)	450	169	1.3	132	2,100	2,391	15	4,400	13	**9,673**
Siyez bulgar (metric ton)	300	127	1.3	50	450	1,556	10	3,000	10	**5,504**
Siyez flour (metric ton)	100	25	0	70	1,600	96	0	1,400	0	**3,291**
Animal feed (metric ton)	50	17	0	12	50	479	5	0	3	**615**

Demand for Healthy Food

Various actors have engaged in multiple initiatives to improve the marketability of siyez bulgur at national markets. Baran, an organic-certified farmer who grows local crops (e.g., Kastamonu garlic) and manages a health food shop in Kastamonu, has dedicated more than two decades of time and investment to revive siyez. Baran collaborated with the Kastamonu Governor, Kastamonu Chamber of Commerce, Kastamonu Chamber of Trade, and local businessmen. In 2022, he shared with pride: "We believed that siyez could be a serious tool for rural development here in Kastamonu." He added that they were "proud of taking part in the conservation efforts, as siyez is a heritage of humankind," and they were "the ones initiating all the marketing and branding efforts."

Market demand for siyez grew in response to these initiatives and increasing awareness about the nutritional properties of siyez and scientific findings that demonstrated siyez's chemical and nutritional qualities (Atalan Helicke, 2018). Local actors, local state officials, and scientists worked together to highlight its health benefits. Scientific research on its nutritional values was a first step; the second was disseminating this information through promotional campaigns. Ihsangazi municipality has sponsored a local harvest festival, named after siyez, since 2008. During the early years of the festival, local authorities shared brochures prepared by local agricultural authorities that highlighted siyez's nutritional properties with visitors.

Initially, the Kastamonu Chamber of Commerce became the main financier of promotion activities: It worked with local traders and businesspeople in Kastamonu, distributed information on siyez's nutritional values to chefs, cookbook and magazine editors, celebrities, nutritionists, and businesspeople at the national scale. It financed promotional events in major urban centers, such as Istanbul and Ankara, purchased high-quality siyez bulgur from Ihsangazi farmers, organized tasting events, sharing food made with local siyez bulgur. These promotional events lasted about a decade. The Kastamonu Chamber of Commerce invited celebrity chefs to Kastamonu to tasting events. Eventually, a celebrity doctor with a television show, endorsed siyez in her quest to ban "white bread," defining it "as valuable as gold" (Karatay, 2015). Promotional events included the sharing of recipes allowing middle-income urban consumers to incorporate siyez into diets of middle-income urban consumers. Over time, faculty at Kastamonu University also contributed to these promotion initiatives, sharing their findings on chemical traits of siyez with national media and contributing to efforts to brand siyez as "ancestral wheat" (Anadolu Ajansı, 2013).

Processing and Marketing of Siyez

Actors in Kastamonu and Ihsangazi also worked to address barriers against the expansion of siyez markets. The first barrier was related to legislation passed in the early 2000s on wholesale marketing, food safety, food packaging, and labeling. The legislation mandated traceability requirements at all phases of production, processing, storage, and transportation. The requirement to produce processed food at an approved facility, completion of paperwork, and monitoring of the facilities presented challenges for small farmers using traditional methods.

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Farmers in Ihsangazi acknowledged that the legislation deterred them from selling siyez bulgur at national markets.[7]

A second challenge has been labor restraints. Farmers in Ihsangazi, local agriculture chamber representatives, and district officials suggested that a factory would help reduce the labor burden and produce a standard product for the markets as required by the new legislation. Several farmers in Kastamonu shared their concerns: Who would finance the new factory? Who would buy siyez bulgur at national markets? How would they distribute their bulgur at national markets? Things started to change with the recognition of siyez bulgur as Turkey's first Presidium[8], an artisan product under risk of extinction, by the Slow Food Foundation of Biodiversity, headquartered in Italy, in 2012.

The Slow Food chapter in Istanbul worked with a diverse group of actors on a national level, in Kastamonu, and in Ihsangazi. Several local farmers in Ihsangazi, including farmer-traders Rahmi, Ahmet, and Baran, started working closely with the Slow Food chapter members. Baran, who is based in Kastamonu, became the main contact for local and national media, and helped prepare the paperwork for Presidium recognition. Rahmi, Ahmet, and members of Slow Food Istanbul chapter attended celebrations of siyez bulgur's Presidium recognition in Italy in 2012. Immediately afterward, Ihsangazi farmers established the Ihsangazi Siyez Farmers Association (the Association), and Ahmet became its President. The Association started with a membership of 40 small farmers in Ihsangazi and encouraged more farmers to grow siyez. Growing media attention combined with the promotional events organized by actors in Kastamonu facilitated an increase in national demand and an increase in price of siyez bulgur (See Table 3).

The Presidium recognition and national awareness about einkorn encouraged other local businesses in Kastamonu to invest in siyez processing facilities and market expansion. A local food company, Tokalı Gıda, expanded its traditional siyez bulgur production facility in the district of Seydiler, Kastamonu, in 2012. Tokalı Gıda had already been experimenting with processing siyez into flour for several years. By 2014, its siyez-processing factory started to operate at full capacity and was producing 13 new value-added food products made with 100 percent siyez flour. These innovative products provided a portfolio of choices for consumers interested in new products, convenience, and authentic taste.

In 2017, Tokalı Gıda started contract farming with 60 farmers in Seydiler, Kastamonu, and started marketing siyez at national markets. By 2018, they expanded contract farming to 250 farmers, distributed high-quality siyez seeds to farmers, and produced 3,000 metric tons (3,306 US tons) of siyez. The company did not seek organic certification but worked closely with farmers, whom they have known through business operations over the years and family

[7] Even experienced farmer-millers and farmer-traders were concerned about the impacts of such legislation on their business. In 2022, Rahmi still sold his siyez products through word-of-mouth and under the brand name of a local food company. Rahmi expressed his concerns that national bulgur standards would not allow existence of impurities in the product. He added that he "would have to pay a big fine" if a consumer found and complained about impurities, such as a stone or a hull, in his traditionally processed siyez product.

[8] The Presidium designation is given to a food product that represents a community of producers inspired by the Slow Food philosophy, a traditional food product, a place, a cultural heritage, and a legacy of knowledge.

relationships. The company encouraged traditional cultivation practices without reliance on inputs and facilitated low-input sustainable agricultural practices. By 2018, siyez became the top agricultural product in Seydiler, Kastamonu (See Table 2). The company aims to support local development and "to bring siyez to every table at reasonable prices." Thus, it continued to promote siyez at national fairs and tasting events, "to at least 500 people at every food event," contributing to market expansion for siyez products.

Table 3: Price of Coarse Siyez Bulgur (for 1 kilogram/2.2 lbs.) Calculated Based on Ethnographic Data and a Comparison of Websites of Selected Food Companies and Supermarkets

Time period	Seller	Price	
		Turkish Lira (₺)	USD ($)
2007	-	1	0.9
2009	-	3	2.2
2011 (July)	-	5	3.1
2013 (November)	-	8	4
2016 (March)	Tokalı Gıda	7.5	2.6
	Yöresel Tatlar	10.95	3.8
	Doğal Ürünler	13	4.51
2019 (January)	Tarım Kredi	15.9	2.98
	BIM supermarket	12.9	2.3
2022 (October)	farmer-trader Rahmi	25	1.35
2023 (April)	Tokalı Gıda	33	1.7
	Kastamonu Doğal	25	1.29
	Carrefour supermarket	43	2.22
	SiyezEvi artisan baker	59	3.05
	Cityfarm organic store	58	3.05
	Zerun 1650 artisan baker	90	4.66

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The interventions of all these actors, from Kastamonu Chamber of Commerce to Tokalı Gıda, were effective in introducing siyez to national markets. Siyez became available on national supermarket shelves. Documentaries highlighted siyez as "ancestral wheat" and television shows shared recipes for bulgur and products made with siyez flour. Siyez cultivation continued to expand to other districts of Kastamonu. By 2017, an entrepreneur with family ties to Kastamonu created a new brand dedicated to siyez products and opened an artisan bakery shop, SiyezEvi, in Istanbul. SiyezEvi serves breakfast, lunch and dinner, and food items made with 100 percent siyez flour. It also sells traditional siyez products, included bulgur and value-added products. The owner-entrepreneur started contract farming with farmers in Devrekani, Kastamonu (See Table 2). She established a museum in Kastamonu showcasing the history of production and processing in Kastamonu; organized "siyez tours" for chefs, celebrities, and nutritionists; and introduced them to farmers growing siyez in all districts of Kastamonu. The entrepreneur supports initiatives conserving "local seeds" and seeks to develop agricultural products "to conserve and maintain ancestor seeds in the best possible way so that future generations can also enjoy it." She organized tasting events "in almost every shopping mall in Istanbul" to share recipes with Istanbul consumers. She aimed to provide "a high-quality product" and, similar to Tokalı Gıda, to create new value-added products that could be incorporated into modern lifestyles of consumers. These initiatives aimed consumers to reacquire a taste for wheat landraces: Consumers would relearn a forgotten taste of bulgur products but also acquire a new taste for siyez flour.

While the motivations of actors in Kastamonu, Ihsangazi farmers, and the entrepreneur in Istanbul differed, they overlapped in their belief in siyez as an ancestral wheat, and heritage and treasure for humankind. Promotion by various actors proved effective: By 2022, almost every tourist shop in Kastamonu sold siyez flour, bulgur, and other traditional products (e.g., *tarhana*, a traditional soup mix; *erişte*, a type of pasta), as well as new value-added products (e.g., siyez granola bars) to tourists visiting the city. New value-added products improved einkorn's marketability: Supermarkets now carry multiple siyez bulgur brands produced by major grain-processing companies, artisan millers, and organic food companies. Urban consumers can access these products easily. The "success" of Kastamonu siyez at national markets has also inspired other local actors to conserve their local landraces and support local livelihoods.

REVIVAL OF IZA WHEAT

Custodian Farmers of Bolu

As the individual and collective initiatives of actors in Kastamonu helped increase awareness about einkorn nationally, einkorn production in Bolu also entered a new phase. Its cultivation followed a similar path of forgetting and revival: By the early 2000s, einkorn production was isolated to the marginal areas of Bolu's Seben and Mudurnu districts, cultivated by only a handful of farmers for household use. Similar to Kastamonu siyez, small farmers continued to cultivate IZA wheat, maintained high quality IZA wheat seeds through seed saving and exchange practices, used it as animal feed to earn a livelihood, and processed it as IZA bulgur for household use and local markets.

Similar to small farmers in Ihsangazi, custodian farmers of Seben take pride in IZA wheat as "ancestral seed" reflecting its role in cultural traditions, their nutrition, and their livelihoods. In 2022, Ali, a 49-year-old farmer in Seben, and his 48-year-old wife, Seher, who grew IZA wheat

for animal feed and household bulgur use, shared their pride in growing IZA wheat. They never grew it for the markets but said they loved the taste of IZA wheat bulgur. Ali acknowledged the role of IZA seeds as "insurance" if the other (high-yielding) wheat varieties grown by the family failed. Ali was also a trader and sold his potatoes at regional markets. They also had livestock operations and fed IZA wheat to their cows. Although he never participated in contract farming, Ali was happy about the "revival" of IZA wheat and finding other farmers with "high-quality IZA wheat seeds" in nearby villages to exchange his seeds with or to buy seeds from. Another certified organic IZA-wheat farmer in Seben, Cihan was 62 years old and started farming in his ancestor fields after retirement in 2018. Cihan was interested in growing the wheat varieties his parents used to grow and in growing IZA wheat under low-input agriculture conditions to demonstrate that organic agriculture was "a viable option for food security." A farmer-miller in Mudurnu district, 57-year-old Evren was growing IZA wheat and processing IZA wheat bulgur for local markets for over 20 years. He shared that he would never give up IZA wheat as he has always grown IZA wheat for his family, relatives, and business.

Local Government

The revival of IZA wheat in Bolu was closely connected to local government initiatives: Bolu Municipality has been engaged in the propagation, cultivation, processing, and marketing of IZA wheat since 2017. Initially, its goal was "to revive a local wheat variety" and "to bring back the taste" of traditional dishes made with wheat landraces. That goal has become more comprehensive over time: Its 2020-2024 Strategic Plan envisions Bolu "to become a municipality that improves community well-being and social welfare, and creates income opportunities in tourism and rural development," particularly by cultivating IZA wheat and organic farming (Bolu Belediyesi, 2019).

Bolu is following the examples of several other municipalities and cooperative movements that are taking more active roles vis-à-vis food production, rural development, and the marketing of food products. Municipal-level initiatives related to healthy food access, reduction of food waste, and growing food in urban areas offer opportunities to address complex social, economic, and environmental challenges facing urban areas (Moragues-Faus, 2021). In Turkey, the redistricting of urban areas in 2014 have placed rural constituents within the borders of urban municipalities and made rural development a priority for local governments (Yalçın, 2022). Local governments also invest in food-related initiatives to support rural constituents, provide more healthy food for the local people, and create revenue. Several municipalities in Turkey have established cooperatives to support local development initiatives, including the production, processing, and trade of agricultural products and value-added products (Yalçın, 2022). Moreover, local governments in Turkey have engaged in collaborative events in the form of seed exchange festivals and local wheat panels. These events, such as the Bolu Municipality's co-sponsorship of a local wheat landrace symposium in 2018, helped raise awareness of the importance of seeds, wheat landraces, and small farmers for food security, environmental sustainability, and climate resilience (Nizam & Yenal, 2020).

The university in Bolu was another key partner in the IZA wheat contract farming project. A plant breeder and academician who worked with public wheat breeding programs for several years has worked at the university in Bolu since 2008. He was interested in on-farm conservation of wheat landraces and engaged in scientific research about the significance of wheat landraces (See Zencirci et al., 2021). He was already working with a local businessperson interested in

conserving local trees and local wheat varieties, and in improving quality of life in Bolu through rural development. The university provided technical assistance in the propagation of the IZA wheat seeds and engaged in scientific research during the contract farming project. Multi-year research projects led by the university also increased awareness about the health and nutritional properties of IZA wheat. The plant breeder-academician and the university also collaborated with local chefs through the gastronomy department to create innovative products with IZA wheat flour and to test these products for taste, baking quality and shelf life. The university and the municipality also collaborated with a brand manager to create a brand for IZA wheat.

Production and Innovation

One of the challenges in the revival of IZA wheat was finding high-quality seed. There were only a few farmers, isolated from each other, with high quality IZA wheat seeds. Bolu Municipality started the contract farming project with a small volume of IZA wheat seeds it purchased from five small farmers in Seben in 2017. After propagating the seeds on its own land for one year, Bolu Municipality started signing contracts with farmers in fall of 2018. Any farmer interested in growing IZA wheat on a minimum of 5 dönüm (5,000 square meters, 1.2 acres) of land was eligible to participate. Bolu Municipality distributed IZA wheat seeds for free to farmers at a ceremony that project partners, the plant breeder-academician from the university, and the local business person, Şerafettin Erbayram, attended. Working with 51 contract farmers, Bolu Municipality promised to purchase IZA wheat above the market price for durum wheat set by the state. During the first year, total IZA wheat harvest was 100 metric tons (110 US tons). Bolu Municipality set aside half of this harvest as seeds for the next growing season and processed the rest as bulgur and flour for sale in local markets through the restaurant, its two retail stores and an online store, managed by the Köroğlu Local Products Production and Marketing Cooperative[9] (referred to as Köroğlu Cooperative from now on).

Bolu Municipality was able to keep its promise of guaranteed higher prices for the first two years: In 2020, it purchased IZA wheat from contract farmers for 512.82 USD/metric ton. The official wheat price was 213.68 USD/metric ton, and the average price for wheat in Bolu markets was 186.61 USD/metric ton (Kan et al., 2022). The price premiums allowed small farmers to cover input costs (e.g., soil preparation, harvest cost), and several of the farmers participating contract farming shared that "contract farming was economically sustainable." However, with the war in Ukraine and global inflation in food prices, wheat prices increased and Bolu Municipality could no longer offer contract farmers prices above the market value.

Bolu Municipality followed similar strategies used by actors in the Kastamonu siyez value chain to promote siyez to urban consumers. In 2022, a representative of Bolu Municipality shared that they went to multiple food fairs and festivals. These cultural and food festivals unfortunately were cancelled during the first year of COVID-19 due to lockdown measures, then resumed. Bolu Municipality aimed to "incorporate IZA wheat in everything," whether it is a traditional or novel food product. The representative shared that the Bolu Municipality produced multiple

[9] Similar to other municipalities' entrepreneurial initiatives in Turkey, Bolu Municipality had established the Köroğlu Cooperative to support local producers through contract farming and create authentic farm-to-table products, and provide a venue for them to sell local products, such as pinecone jam.

value-added products with IZA wheat so that consumers would "become familiar with the taste of IZA wheat." She acknowledged that they rotated their products based on labor requirements, but these initiatives have made IZA wheat accessible to urban consumers. She also acknowledged that the price of their IZA bread was competitive at the market. All these initiatives and the availability of IZA wheat at two retail stores of the municipality and at its restaurant connected health-conscious urban consumers with small farmers conserving landraces in new ways. These initiatives also helped consumers reacquire taste for IZA wheat, which was once part of local diets.

Conclusion

The valorization of landraces and sustaining the value chain in the long run requires the financial commitment of key actors, including businesses and local governments, who can assume risks in the production, processing, and distribution of wheat landraces. The case studies of einkorn conservation in two different locations in Turkey demonstrate that a multitude of actors were motivated to conserve them, to collaborate with small farmers, and to finance production, processing, and marketing efforts. These collaborations took multiple forms, from trade partnerships to procure high quality bulgur products for food tasting events to contract farming through sustainable production techniques. Small farmers continue to engage in seed exchanges individually, train young farmers to produce and process landraces, and aim to conserve traditional processing methods despite increasing pressures from changes to law and climate.

The case studies in Turkey further demonstrate the initiatives to connect a locally known but underutilized crop to urban consumers nationally. One important step has been increasing consumer demand and sustaining that demand. The revival of einkorn in Turkey involved the promotion of health properties and nutritional qualities of einkorn by a multitude of actors in different venues. However, such promotion alone was not adequate. The actors along einkorn value chain coordinated food festivals and tasting events, and brought recipes cooked with siyez and IZA wheat to consumers to familiarize them with the taste and cooking methods. Taste acculturation was critical to marketing einkorn nationally. These collective initiatives aimed for consumers to reacquire a taste for wheat landraces, which were once part of the traditional diets, and acquire a new taste for einkorn flour products. While the actors who financed these promotion activities, were different in siyez and IZA wheat cases, actors in both cases emphasized ensuring a high-quality product and providing innovative products to the markets to cater to the expectations of consumers. In both cases, local business and local government also financed the production, processing, and distribution of siyez and IZA wheat through contract farming. While providing an adequate income to small, marginalized farmers, such initiatives also helped small farmers overcome risks related to marketing of their products.

These shifts continue to undermine the well-being of small farmers and wheat landraces. Yet, there is expansion of einkorn cultivation in both Kastamonu and Bolu, together with growing awareness about wheat landraces and their conservation among consumers, small farmers, policy makers, plant breeders, and other actors in the agri-food system. While it may be too early to assess the effectiveness of these initiatives to long-term survival of the wheat landraces, it is important to remember that einkorn can now be found at national markets and reach urban consumers. Despite its small volume of production, einkorn production continues to provide livelihoods for a small number of marginalized farmers.

Landraces are a dynamic component of agricultural biodiversity, and their survival is the outcome of human and ecological relationships evolving in political, legal, social, and cultural contexts. The agricultural policies of the twentieth century have been hostile to landraces. Yet, their persistence and "comeback," not just in Turkey but elsewhere, as in the case of farro (Negri, 2003) quinoa (Alandia et al., 2020), and millet (Choudhary et al., 2023), demonstrate that their effective conservation and revival also involve interaction of social, economic, political, and ecological factors. Following the wheat landraces in Turkey for about 15 years also shows that conservation of crop biodiversity on-farm is not a simple story of loss of diversity and genetic erosion but a complex story of persistence and revival involving multiple actors and initiatives.

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