

Pioneering Communities in Dissemination of Local Wheat Varieties and Products in Turkey

Türkiye'de Yerel Buğday Çeşitlerinin ve Ürünlerinin Yaygınlaştırılmasında Öncü Topluluklar

Mesut Yüce YILDIZ^{1*}, Tayfun ÖZKAYA²

Abstract

Modern wheat varieties developed since the 1960s have increased yields but have also brought with them serious ecological, social and health problems. Local wheat varieties must be produced, developed, conserved and disseminated by farmers. In this research the pioneering farmer/consumer communities in Çanakkale, Balıkesir and Kars provinces and some community supported agriculture groups in Izmir province active in dissemination of local wheat varieties and breads and other products are examined. Participatory action research methodology was used among producer groups and food communities. The research question was developed through common problems and solutions by involving producers and consumers during the field research in line with participatory action research. The local wheat production of producer groups and the processes of supplying their products to the market were carefully analyzed and this information was shared with food groups. In the food groups, ways to increase the consumption of local wheat products were sought with the information shared. As a result, it is seen that pioneer groups that ensure direct marketing of products from farmers to consumers, organize farmers, work holistically and increase women's participation are more successful in the geographical dissemination of local wheat varieties and ensuring seed sovereignty. In consumer groups, it was observed that understanding the production process and identifying problems related to consumption through focus group studies initially increased the consumption of local wheat products. However, the high cost of bread made from local wheat varieties constitutes one of the biggest obstacles. Collaboration between consumers and food groups with local producers can increase the spread of the production and consumption of local wheat. Local governments can also play an important role in promoting local wheat and its products. One of these supports could be participatory plant breeding.

Keywords: Local wheat varieties, Seed sovereignty, Food groups, Extension, Participatory action research, Sourdough bread, Turkey.

¹*Sorumlu Yazar/Corresponding Author: Mesut Yüce Yıldız, Department of Agricultural Economics, Faculty of Agriculture, Ege University, Bornova, Izmir, Türkiye. E-mail: mesut.yuce.yildiz@gmail.com  ORCID: 0000-0002-3762-9940

²Tayfun Özkaya, Department of Agricultural Economics, Faculty of Agriculture, Ege University, 35100, Bornova, Izmir, Türkiye. E-mail: ozkayatayfun@gmail.com  ORCID: 0000-0001-5769-1920

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Öz

1960'lardan bu yana geliştirilen modern buğday çeşitleri verimi arttırmış olsa da ciddi ekolojik, sosyal ve sağlık sorunlarını da beraberinde getirmiştir. Yerel buğday çeşitleri çiftçiler tarafından üretilmeli, geliştirilmeli, korunmalı ve yaygınlaştırılmalıdır. Bu araştırmada Çanakkale, Balıkesir ve Kars illerindeki öncü çiftçi/tüketici toplulukları ile İzmir ilinde yerel buğday çeşitleri ile ekmek ve diğer ürünlerin yaygınlaştırılmasında faaliyet gösteren bazı topluluk destekli tarım grupları incelenmiştir. Üretici gruplar ve gıda toplulukları arasında katılımcı eylem araştırması yöntemi kullanılmıştır. Araştırma sorusu katılımcı eylem araştırmasına uygun şekilde saha araştırması sırasında üreticilerin ve tüketicilerin dahil edilerek ortak sorunlar ve çözümler üzerinden geliştirilmiştir. Üretici grupların yerel buğday üretim şekilleri ve ürünlerini pazara tedarik etme süreçleri dikkatle şekilde incelenmiş ve bu bilgiler gıda grupları ile paylaşılmıştır. Tüketici gruplarda ise paylaşılan bilgiler ile yerel buğday ürünlerinin tüketimini artırma yolları aranmıştır. Sonuç olarak, ürünlerin çiftçiden tüketiciye doğrudan pazarlanmasını sağlayan, çiftçileri örgütleyen, bütüncül çalışan ve kadın katılımını artıran öncü grupların yerel buğday çeşitlerinin coğrafi bazda yaygınlaştırılmasında ve tohum egemenliğinin sağlanmasında daha başarılı olduğu görülmektedir. Tüketici gruplarda ise üretim sürecini anlamamanın ve odak grup çalışmaları ile tüketime dair sorunların belirlenmesinin ilk olarak yerel buğday ürünleri tüketimini arttırdığı gözlenmiştir. Ancak, yerel buğday çeşitlerinden yapılan ekmek pahalı olması en büyük engellerden birini oluşturmaktadır. Tüketiciler ve gıda gruplarının yerel üreticiler ile iş birliği yapması yerel buğday üretimi ve tüketiminin yaygınlaşmasını arttırabilir. Yerel yönetimler de yerel buğday ve ürünlerinin yaygınlaştırılmasında önemli bir rol oynayabilir. Bu desteklerden biri de katılımcı bitki ıslahı olabilir.

Anahtar Kelimeler: Yerel buğday çeşitleri, Tohum egemenliği, Gıda grupları, Yayım, Katılımcı eylem araştırması, Ekşi mayalı ekmek, Türkiye.

1. Introduction

Wheat, known as the first plant which was domesticated in southwest Asia, 14000 years ago (Kimber and Feldman 1987). The origin of wheat is Southeastern Anatolia (Uhri, 2011). The great biodiversity of wheat in Anatolia and the presence of local wheat varieties make these genetic resources in Turkey very important for the sustainability of wheat production in the world.

The aids provided by developed countries to developing countries in the Marshall Plan program between 1948 and 1951, created a great transformation. Many changes such as increase in agricultural mechanization and yield, the dominance of chemical fertilizers, synthetic pesticides usage, and monoculture agriculture have been realized. This process led to the so called “green revolution” after a while. One of the most important developments of the green revolution was the breeding works done by Norman Bourlag, using Mexican dwarf and semi-dwarf wheats (Karakoç, 2008).

In the 19th century, Japanese scientists developed the high yielding Norin 10 variety by crossing their local wheat called Daruma, with Red Winter Turkish wheat. (Powell et al., 2013) American scientists crossed the Norin 10 variety with the native American variety Brevor and took these cultivars to Mexico. These plants had been introduced to the breeding programs in Mexico by Norman Borlaug and high yielding varieties were bred (WWF, 2016).

It is stated that the success in the yield increase of these semi-dwarf wheats has been achieved especially using nitrogen fertilizers. (Perkins, 1997). However, the full potential of these new seeds can only be realized when proper agricultural practices are followed, such as good soil preparation, the use of large amounts of fertilizer, the correct proportion and planting depth, and proper use of water, weed and pest control (Karakoç, 2008).

While Mexican seeds were grown on an area of 50 decars in 1964, in Turkey, it started to be grown on a land of 14,554,000 decars within 5 years, in 1968. India, Pakistan and Turkey were the countries adopting this production system the most (Karakoç, 2008). Although it is claimed that the green revolution is a great success, in fact, there are intense criticisms that it has increased the foreign dependency especially of underdeveloped countries, made farmers dependent on agricultural inputs sellers, led to the loss of seed sovereignty, and started the process of loss of people knowledge (Smale, 1997; Magdoff et al., 2000)

The effect of wheat products on human health is one of the most popular research and discussion topics in recent years. The negative effects of gluten protein, which is more abundant in the structure of improved wheat varieties, on human health have been the subject of many scientists (Dohan, 1966; Davis, 2011). Breeding efforts to increase gluten protein and changes in gluten structure have created a perception that the consumption of modern wheat is harmful to health (Davis, 2011). These comments also increase the production and consumption of local wheat varieties and products. The study conducted by Davis (2011) revealed the negative effects of high gluten content of industrial wheats and the changes in genetic structure on human health. In his study, Davis shows that industrial wheat is as the chief culprit for factors such as fatigue, immune, digestive, and nervous system problems, obesity and diabetes. Davis draws attention to the fact that local wheat varieties do not cause the same problems in his study. Boxstael et al. (2020) and Akçura et al. (2002) compare wheat landraces and industrial wheats in terms of mineral substances. Although these researches were actually made for the selection of the local wheat varieties as breeding material, it is important that the local varieties have been found to be richer in terms of mineral substances. Local wheat varieties are much richer in mineral substance content (Akçura et al., 2002; Hocaoglu and Akçura, 2017; Boxstael, 2020).

Mexican dwarf wheat started to be grown in Turkey in 1967 under the name Sonora-64. The first experiments were carried out in Adana Province under the leadership of Bahri Dağdaş who was the Minister of Agriculture (Koçtürk, 2009). The Minister of Agriculture of the period declared that Turkey would reach the potential to export wheat even after. However, the situation did not develop as expected, and serious problems arose in terms of nutrition. With the breeding studies, wheat varieties in Turkey were hybridized with higher yielding varieties developed in international research institutes to obtain new varieties with shorter stature, more productive but less resistant to drought, dependent on pesticides and chemical fertilizers. As a result of these developments, instead of producing their own seeds, farmers began to depend first on state institutions and later on seed companies. In Turkey, where a different variety or type of wheat was grown in almost every village in the 1930s (Gökgöl, 1939;

1954), the biodiversity of wheat started to shrink. Farmers first lost their seed sovereignty, later gradually lost their knowledge to produce, develop, improve, and breed their own seed like spike choose (başak çekme) methods. The farmers who started to buy seeds, fertilizers and pesticides from the market, gradually began to pay higher prices for these industrial inputs. On the other hand, the price received by the farmers for wheat has been respectively diminished due to the downsizing of State Grain Board (Toprak Mahsülleri Ofisi) which was doing supportive purchasing before the globalization period, withdrawal of the state from supporting wheat, and lowering the custom duties in wheat importation.

The development of the local wheat acreage can reduce costs by ensuring the seed sovereignty for farmers, and having farmer control on production, and leaving external inputs. However, it does not seem possible to expand local wheat varieties acreage, which are rich in terms of nutrition and do not contain changed gluten structure, unless these are sold at good prices by the farmer.

Although the health debates about modern wheats in the country partially popularize the option of not consuming any wheat, which is supported by some physicians, this trend has remained marginal in Turkey, where main diet is wheat. Contrary to this trend, there is an attitude that completely rejects and ignores the debates on health, ecology, and socio-economic issues related to wheat, which is supported by the industry that produces wheat and its products and the scientific circles that support this industry. The Ministry of Agriculture and Forestry is also insensitive to the health problems caused by industrial wheat in Turkey. Ministry researchers generally consider local wheat varieties and landraces as only breeding material like the mainstream breeders of the world. For this purpose; local wheat varieties are collected, preserved ex-situ and even used for breeding to have drought resistant wheat varieties. The ministry, to some extent has understood the importance of the local wheat varieties for the adaptation to climate crisis. However, the Ministry does not show any interest in the production and development of local seeds in the hands of farmers and participatory plant breeding. The basic approach of the ministry is to preserve the basic structure of modern wheat varieties.

What needs to be done in Turkey, the homeland of wheat, is to make use of local wheat varieties instead of extreme views that on the one hand recommend not eating bread at all and on the other ignore criticisms of modern wheats. Considering that there is no participative wheat breeding depending on local wheat varieties, and the yield of local varieties is low respectively in Turkey now, at that step, if the price received by farmers for local wheat varieties can be increased, the dissemination of them will be possible. After this dissemination begins, we can talk about entering a process that will end the health problems caused by modern wheat and the dependence of farmers on company seeds and agrochemicals, if participatory breeding studies are carried out based on local wheat varieties, and agroecological practices that will increase yield and reduce costs are adopted. With participatory breeding studies based on local wheat varieties, a large number of varieties or types without copyright will be produced in many regions (locations) instead of the existing system based on company hegemony. Participatory research and participatory breeding provide good examples of what scientists can achieve hand in hand with farmers.

The achievements of participatory plant breeding (PPB) are presented in the work of the Philippines-based Masipag organization called “Food Security and Farmer Empowerment” (www.masipag.org). For example, rice varieties developed by the Masipag organization in the Philippines have been very successful in the participatory breeding (Masipag, 2014). There has been no statistically significant difference in terms of yield per hectare between the paddy varieties developed by farmers and scientists, produced with ecological methods and the yields of paddy produced by industrial agriculture methods. However, while the yield regularly increases over the years in the ecological farming group, it decreases in the conventional group. Ecological group does not purchase inputs such as synthetic pesticides, chemical fertilizers, seeds. Then costs are falling. For this reason, net incomes in the ecological group have been 1.5 times higher than those engaged in industrial agriculture (Masipag, 2014).

Evolutionary-plant breeding which is also a PPB method using big populations had been applied in wheat, barley and rice successfully. Crop populations with a high level of genetic diversity are subjected to the forces of natural selection. Those plants favored under prevailing growing conditions are expected to contribute more seed to the next generation than plants with lower fitness (Döring et al., 2011).

Ceccarelli et al (2022) wrote about the results:

The examples of Iran, Italy and other countries indicate that Evolutionary Populations (EP) can be defined as “smart crops” because they represent a triple “win”. They are good for the planet, as they reduce the use of chemical inputs and allow adaptation to the complexity of climate change; they are good for the consumer as they produce healthy food and they are good for farmers as they generate income. The main hurdle in the diffusion of EPs is seed laws. EPs do not meet the Distinctness, Uniformity and Stability (DUS) requirements for their official registration and marketing, established by the International Union for the Protection of New Varieties of Plants (UPOV).

Various researches in the world has proved that the organizations that struggle to ensure the seed sovereignty, has accelerated the diffusion of local varieties, and agroecological practices. Research on two grassroots organizations affiliated with the “Colombian Free Seed Network” (RSCL) has shown that the activities of collecting and protecting local seeds have two types of impact on the spread of agroecology:

The first is a horizontal or scaling out effect, given that these activities involving the adoption of agroecological practices which allow for spreading knowledge, principles, and practices among seed custodians, their local communities and organizations, and the networks of these organizations. The second is a deepening effect, given that: 1) seed custodianship reaffirms and/or generates new peasant and indigenous identities and ways of life; 2) seed recovery, conservation, and defense conform a multi-dimensional process that is material, political, and symbolic, which provides cultural and territorial rootedness, and 3) strengthening of the social-organizational fabric through collective actions and strategies by seed custodians in their territories in defense of native and creole seeds. (López et al., 2019)

In an article examining three organizations in India and one organization in the USA, different practices in reappropriation of seeds were analyzed. (Patnaik, 2017). These organizations are the in-situ seed banks (LSP and Sambhay) which are two local non-governmental organizations in Odisha, India; OSSI (Open-Source Seed Initiative) in the USA, which implements the open-source approach, and OSSS (Open-Source Seed System) in India, which is affiliated with the Organic Agriculture Association. Two in situ seed banks in Odisha aim to repair the metabolic rift between nature and society created by capitalist agriculture and by the loss of agricultural biodiversity by providing indigenous farmers to access to seed and reuniting community and resources (seeds) (Patnaik, 2017). Organizations using the open-source approach bring seeds back from the realm of confiscation and monopolization through enclosure and restrictive sanctions to the collective sharing area based on open-source principles (ibid.). Both OSSI and OSSS use open-source licenses to prevent monopoly and appropriation. In the same context, LSP protects rice varieties, Sambhav tries to protect different plant varieties, OSSI gives more importance to seed breeders, OSSS works in a different socio-political context in India (ibid.). Despite their different working styles and purposes, these organizations have contributed significantly to the re-sharing of local seeds.

Vernooy et al. (2017) demonstrate that community seed banks are more successful in protecting and developing local seeds and local knowledge, and enhancing the resilience of communities against climate crisis.

Atalan Helicke (2019) based on fieldwork in Turkey, in her article examined the conservation and development outcomes for two traditional wheat varieties, einkorn (*Triticum monococcum*) and a local bread wheat variety zeron/zerun (*Triticum aestivum*). She wrote:

The two cases demonstrate the importance of the existence of a small, but dedicated group of farmers for traditional variety production over the years to sustain the continuity of seed exchange, and sustain traditional knowledge of seed saving and processing. Similarly, without addressing power relations, market mechanisms and collective action may fail. Participation problems may undermine access of farmers to the collective action and markets.

At the current stage in Turkey, the dissemination of local wheat varieties and its products such as bread and bulgur (cracked wheat), etc., is a difficult goal but should be reached. As seen in other researches, the presence of pioneer farmers is an important factor in seed selection, especially in wheat. The same may be true for the dissemination of local wheat (Keleş, 2019). To achieve this difficult dissemination, pioneering activities of dedicated farmer and consumers’ groups are needed. There are communities working in this field in Turkey. This paper is examining the activities of these groups and trying to determine the success factors of this dissemination.

2. Materials and Methods

2.1. Material

The scope of this study is three producer groups in Çanakkale, Balıkesir and Kars provinces and five community supported agricultural groups in İzmir (Figure 1). The main reason why these producer groups were chosen especially from these provinces is that they show different structures in terms of organization, level, and forms of relations with local wheat producing farmers. In the Çanakkale group, in Bayramiç district, local wheat production is carried out by a single group member who moved to the countryside, and flour etc. products are marketed to different food groups and consumers. The Balıkesir group is located in the city center, but some of its members also engage in agricultural production. The group buys wheat and other agricultural products from 18-20 farmers and makes bread with sourdough. It also works as a food group. The Kars group, on the other hand, disseminated the local wheat varieties to all the farmers in 23 villages and 470 farmers by taking the Boğatepe Village as the center. The most important achievement of the Kars group is the dissemination of local *kavlıca wheat*. Local wheat has been cultivated for more than a decade and is now practiced by almost all the producers of the group. The group carries out its activities in the field with a holistic approach and creates associations and cooperatives.

As the consumer groups discussed in the research, there are five community supported agriculture groups working informally and collaboratively within the Ege University campus. Since the participatory action research methodology was used in the study, the groups were selected, who were the members and coordinators of these researchers. The Nature and Human Friendly Food Group, one of these groups, is the first community supported agriculture group established in İzmir, as it has been instrumental in the establishment of the other four groups on campus and continues to support them. These five groups work collaboratively on product demand, relation with farmers, etc. The founding group has 118 members. In the other groups, the number of members is much less. The members of community supported agriculture groups are academics, officers, and a small number of consumers located near campus. The Nature and Human Friendly Agriculture Group-established in the Department of Agricultural Economics-was the first group. Respectively, the Public Health Group, the Faculty of Economics Group, the Pathology Group and the DOKTAR (members of a techno park company) group were established. The DOKTAR group is now disbanded. All these groups are informal and do not have any relationship with the university administrations. Since the incoming products are shared by the members without waiting anywhere, there is no need for a place such as a warehouse or selling area. These food groups have relations with the producer groups mentioned. The food groups have bought flour and other foodstuffs from them, and actively participated and supported activities such as seed exchange festivals and conferences supported or organized by producer groups in these provinces. These food groups do not have a contractual and prepayment relationship with farmers like the "community supported agriculture" groups in France, Belgium. However, they provide various supports such as finance, marketing and information support to the farmers or bread producers they are affiliated with. In the last few years, these groups, together with other food groups in İzmir, have been working on production planning, finance, etc. with farmers in certain products (potatoes, onions, etc.) and making agreements. Thus, these groups show a progress towards gaining the qualification of advanced community supported agricultural groups.

These food groups examined, are suitable organizations from which information can be obtained, and participatory actions can be organized about the consumption of breads produced with sourdough from local wheat varieties.



Figure 1. The research areas

2.2. Method

Participatory action research methodology was used in this research. It may be useful to make a brief assessment of the development of these approaches. Rapid Rural Appraisal (RRA), which was developed and implemented in the 1980s, quickly developed and became widespread, turning into Participatory Rural Appraisal (PRA) in the 1990s (Chambers, 1994). Afterwards, Participatory Rural Appraisal (PRA) has evolved into Participatory Learning and Action (PLA) covering a wide range of subject and location (Chambers, 2004). The difference between participatory action research and other traditional researches, is that it does not distinguish between observation and action. Participatory action research is cyclical and dynamic. Problems are raised and discussed through participatory meetings with people living in the research area (Wadsworth, 1998). Observation and action are cyclically applied together throughout the research. In Participatory Action Research, hypotheses are determined together by the participants during the research process. Contrary in other studies, the participants are not excluded from this stage, then the reality is tried to be changed by intervening in life. Whether the recommendations are realistic or feasible is revealed during the research. In traditional research, action is usually taken after observation and data collection. In traditional research methodologies, it is unclear whether the recommendations will actually work. This may cause the action to fail and require a reboot to fix the problem. However, this will waste a lot of time. In addition, there is no guarantee that the research that will be repeated again will be successful. The same can be true for participatory action research. However, in every case of failure in participatory action research, a new method or theory can be developed (Wadsworth, 1998). In this research, participant observations were made in farmer/consumer groups and in-depth interviews were conducted with group members. Participatory action research methodology was used in the farmer/consumer groups and food groups in İzmir. The researchers are among the food groups coordinators at Ege University and are in contact with local wheat producer groups. The coordinators have been involved in activities such as buying flour, participating in the seed exchange festivals of the groups and giving support on various issues. They also worked in community supported agriculture groups to increase the consumption of breads made of local wheat varieties flours and sourdough. For this purpose, focus group studies and in-depth interviews with group members were conducted in groups. Flour made from local wheat varieties was purchased from producer groups, and a woman in İzmir urban area who knew how to make bread and women farmers who supplied food groups were encouraged to make bread. Due to the nature of participatory action research, information from real life experiences was compiled and analyzed of both the production of local wheat varieties and their consumption in food groups. Participation in focus group meetings held in food groups was higher than expected. 50 people attended the food group meeting of the Department of Agricultural Economics, which has 118 members. Almost all of the group members attended the meetings of the group of 30 people within the body of the Faculty of Medicine, Department of Public Health. The majority could not be achieved in the Faculty of Economics group meeting. However, one of the participants, an academician who teaches economic history, ensured that the meeting was held during the postgraduate course. A small number of food group members participated in this meeting. At the meeting, postgraduate students were encouraged to participate in the food group. Full participation was achieved in the DOKTAR group. The focus group could not be realized with the pathology group. In each food group, specific topics related to wheat and bread were also discussed, depending on the academic interest of the group. The information obtained from the producer groups was shared with the consumers in the focus groups, and solutions and suggestions were presented to increase the consumption of local wheat varieties breads and other products.

3. Results and Discussion

3.1. Producer Communities

The three producer groups in which the studies were carried out, differ among themselves in terms of working styles. The Çanakkale community has urban members and they have ecological values. Except for one member of the group, each member has different jobs in the cities. These members rarely contribute the farm. The group has also created a consumer community around itself. The community tried to establish relations with other peasants/farmers. Group members pioneered the organization of local seed exchange festivals in Çanakkale/Bayramiç. This community made efforts to conserve, test and propagate various local wheat varieties. Volunteers, who were partially paid, worked at the farm from time to time. Although the relations with the villagers were not very deep, they contributed to the appreciation of a local wheat variety (*yellow wheat*) in Bayramiç district.

They also contributed to the resistance against mining and geothermal initiatives that threaten the environment in Çanakkale.

The group founder, who lives in Yeniköy, has an engineering education, and has worked in cities so far. The founder started production in 2011 as part of an eco-project. He started production by adopting local seeds and determined wheat as his main production activity. He initially started production with only local wheat varieties suitable for the region, in the following years, he planted nearly twenty wheat varieties on the farm and put them to trial. The founder also set up a vegetable garden on the farm for his own needs. On the farm; barley, rye, about seven tomato varieties, 64 varieties of peppers, four varieties of potatoes and many other vegetables are grown.

The founder has developed a high biodiversity area by producing local wheat varieties with agroecological methods. This area consists of local wheat varieties seeds of which are difficult to find. Over time, it was seen that the members of the group left for varied reasons and the work was continued by only the founder.

“Balıkesir Life Friendly Product Solidarity, Production and Sharing Group” first started as a consumer movement. The leader of the community made efforts to produce bread made with sourdough based on local wheat varieties, using his own means. Instead of undertaking the production of wheat, the community establishes relations with the farmers in Balıkesir and buys the local wheat they produce at a slightly higher price than the market prices. The efforts of the community have contributed to the continued production of local wheat farmers.

This group contributed to the production and consumption of flour and bread made from local wheat varieties by food groups in other provinces. The Community also contributed to the production and consumption of flour and bread made from local wheat varieties by the food groups in other provinces. One of the aims of the group is to prevent the increasing rural gentrification. The group aims to support the peasants and farmers who have been in production for years instead of people who come to rural areas from cities and deal with agricultural production. In terms of the difficulty and continuity of agricultural production, people who already participate in rural production are considered more important for the group. For this reason, they aim to get organized in consumption rather than production. For this, they try to make the bread produced from local wheat varieties more attractive. The use of different local wheat varieties gives a positive result in terms of the taste of the bread. Half of the bread (50%) consists of Köse wheat for its soft texture. In addition, medium hard (Bezozta and Sarı buğday) and hard wheat (Karakılçık, Kızıl buğday and Akakser) are used. Kara Çavdar (10%) is mixed to enhance its taste. Breads and other products are sold to members and other consumers in a shop belonging to the group in Balıkesir city center.

The Kars community especially supported the disappearing local wheat varieties and prevented their extinction. The community first established a cooperative, then closed it and established an association (Boğatepe Environment and Life Association), then reconstituted by establishing a cooperative next to the association. The pioneers of the community are people who also have financial means. First of all, it is a dedicated community the aim of which is to develop their own village (Boğatepe) and to ensure welfare. The community was interested not only in the local wheat varieties but also in any subject in the villages. These include the evaluation of medicinal plants, the improvement of rural tourism, the establishment of a cheese museum, the production of traditional cheeses in ecological ways, the nutrition education, the development of home gardening, and the publication of books on various subjects. They sent ecological products to almost all community supported agriculture and food groups in Turkey with the marketing system they founded, and it has contributed to the success of these groups. The community has spread its influence in 23 villages, with the Boğatepe Village being the center. A direct affiliation has been established with the farmers. Sociologically, the social status of women in Kars is quite advanced compared to the country. One of the two co-chairmen and spokespersons of the group was a woman, and the women played a key role in the activities of group. The community has succeeded in spreading agroecological techniques in an area of 23 villages. Villagers, who has lost their seed sovereignty to a large extent before, now produce their own seeds in this region, and have learned and re-applied traditional knowledge about seed development from those who know. Similarly, farmers who use pesticides and chemical fertilizers have minimized them, and many farmers do not use them at all. Farmers who sell wheat and other products to intermediaries can sell their products directly to the consumers through the marketing system created by the community. This transformation has given farmers a significant autonomy. The villagers are proud of protecting the local wheat varieties, producing and consuming more delicious and valuable bread, bulgur, etc.

It can be said that the Kars community has been successful in its work. The factors behind this success could be listed as follows: Holistic approach practices, giving importance to women in activities and management, development of local seeds in the hands of farmers, importance they attach to reviving traditional knowledge, especially in seed selection and development, working in intense cooperation with farmers, seed sovereignty and the usage of local ecological agricultural inputs.

3.2. Community Supported Agriculture Groups

Efforts were made on the consumption of bread made with sourdough from local wheat varieties in community supported agriculture groups at Ege University and in a newly established neighborhood group, training studies were conducted, and problems were identified with focus group studies.

At first, flour was brought from the Balikesir community and bread was produced by a woman from the city in domestic conditions. The consumers did not like the first breads due to the hard texture of the breads. This manufacturing defect had not been fixed. Bread consumption decreased rapidly in the groups. As a result, this first bread maker was left. Later, a villager family that provided ecological products to the groups sent bread made of flour of the local wheat varieties they produced. Bread consumed in groups increased nearly twofold, thanks to the fact that bread was brought with other products and the bread could be made softer than the previous ones. Bread was brought to the groups once a week along with other products. However, under these conditions, transportation and bread production costs are that much high, which causes the price of bread nearly three times that of industrial bread. These problems have been overcome because the groups' members were in the middle-income group and most of them are highly educated. However, this also has a limit. Although it changes according to the weeks, only about half of the members of the groups demanded these breads. The occasional disruptions in the supply of bread have been also effective in the low rate of this.

Table 1. The perceived benefits and problems of sourdough breads produced from local wheat varieties by food groups members

Benefits	Problems
Health <ul style="list-style-type: none"> No chemical additives and pesticides Rich in minerals and vitamins Good for the digestive system, satiating Healthy blood sugar level Psychological 	Expensive Price: Local wheat bread: 300 gr, 2,82 TL. Industrial bread: 300 gr, 1 TL.
Delicious	Hardness
Good taste (for the majority of group members)	Unusual taste (for some group members)
Values <ul style="list-style-type: none"> Solidarity with the peasant Ecological benefit Contribution to biodiversity 	
Less waste	
Accessibility	

The consumption of local wheat varieties bread is generally considered healthy by group members. In addition, the perception that it is rich in minerals and vitamins is one of the factors that support the consumption. It is thought that blood sugar can be kept more evenly by its consumption. This bread is healthy for the digestive system. While, most members stated that the breads were delicious, some people had digestive problems. Consumption of this bread also provided psychological benefits to people in terms of values. The idea that they support the peasants, biodiversity and ecology is widespread among consumers. The fact that the consumption of these breads is not excessive because they are satisfying, is one of the supporting factors. At the same time, the long shelf life of wheat landraces bread prevents waste. Bringing bread to the place where members work also provides convenience in terms of access and preference. However, the price of local wheat varieties bread is approximately three times higher than industrial bread. One of the negative factors is that the bread is produced harder from time to time. As a result, even in the groups discussed, not all members consume bread produced with sourdough from local wheat varieties.

The perceived benefits and problems of sourdough breads produced from local wheat varieties are summarized in *Table 1*.

The problems can be solved to a great extent if widespread production of local wheats and breads is carried out. However, this is undoubtedly a difficult goal to achieve. In this first stage; The support of educated and middle-income people is needed to protect and spread local wheats and to increase the consumption of bread and other products produced from local wheats. This is the first stage we are in. Serious support of central and local government is needed for much more widespread production and consumption. It is also necessary for wheat breeders to start a program based on local wheat varieties by adopting participatory breeding approaches, and the extension of agroecological techniques is required. This issue will be discussed in the next section.

3.3. *The Role of Central and Local Governments*

Central and local governments can greatly influence the dissemination of local wheat varieties and products. Rosset and Altieri state that:

National policies not supportive of agroecological approaches are largely responsible for alternatives remaining in the margins. In most countries there is a continuous policy failure in providing the adequate economic environment needed for the transition to agroecological production systems” (Rosset and Altieri, 2017).

The central government considers local wheat varieties only as breeding material for modern wheats in Turkey. The research work of the Ministry of Agriculture and Forestry is directed towards this goal. In many municipalities, there is a strong will to protect and disseminate the local seed varieties contrary to the central government. Starting from 2010, municipalities with a progressive attitude mainly in Western Anatolia contributed to the organization of seed exchange festivals or organized them by their own. Some municipalities such as Seferihisar/İzmir, Muğla, Nilüfer/Bursa, Çanakkale, İzmir, Edirne have established seed centers and contributed to the protection and propagation of the seeds of many products, including wheat. Seferihisar Municipality strongly supported Topan Karakılıç wheat variety. This local variety is distributed to farmers, and thus, the extinction of the variety has been prevented. The municipality bought the wheat from the farmer and distributed the flour to the villagers who would make bread, thereby ensured the recognition of the bread (Nizam and Yenal, 2020). In Turkey, as in the world, modern wheat varieties and industrial bread production are accepted as a dominant paradigm for both farmers and the majority of consumers. This industrial agriculture system, which causes the global climate crisis, unhealthy nutrition, farmers' loss of seed sovereignty, and their dependence on agricultural input industries and food industries, is seen as indispensable. However, this paradigm can be changed, and central and local governments can play serious roles in this regard. Using the model prepared by the "International Panel of Experts on Sustainable Food Systems", we can list the things that can be done in this regard as follows (IPES-Food, 2016).

Against path dependency: The production of modern wheat for years has created a path dependency that makes it difficult for farmers to switch to a different production model. First of all, it has become difficult to find seeds of local wheat varieties. If seeds are provided easily, with high quality and cheaply, this path dependency will begin to be broken. Weeds have increased due to the chemical fertilizers used and the problem has grown due to the inability of short modern wheats to suppress these weeds, and the use of herbicides has become inevitable. The herbicides usage has created another path dependency. Agroecological techniques, such as plowing at different levels, should be expanded for managing weeds.

Similarly, another path dependency has emerged in flour production. Flour machines have been developed in accordance with modern wheat varieties. Existing flour industry machinery is incapable for some local wheat varieties which are hard shelled. Appropriate machines have started to be produced in Turkey. The improvement and supporting of these machines would be beneficial.

Against the export and mass marketing orientation: An important part of wheat production and import in Turkey is allocated to flour and pasta exports. Large flour, pasta and bread companies lead to

the exclusion of local wheat varieties by determining the wheat varieties and standards they buy. There is no other option but to use local wheat as animal feed. It is not easy to obtain products such as local wheat flours and sourdough bread etc. While food groups provide these to consumers at reasonable prices, they can also provide better prices for farmers. However, these products are sold at high prices in the markets, yet there are doubts that

they are truly ecologically produced. Community supported agricultural groups, consumer cooperatives, ecological peasant markets, farmer cooperatives can be supported to solve these problems. Support of these options by the central government and local governments will contribute to the dissemination of local wheat varieties and agroecological techniques.

Against the expectation of cheap food: Ecological products are considered expensive by consumers. On the other hand, as a result of the inadequacy of direct marketing opportunities, those who produce ecological products sometimes cannot sell their products or sell them at the price of industrial agricultural products. Central and local governments can support this production by purchasing ecological and local wheat varieties from farmers at better prices. Nutrition education can also be given to large masses of people in this regard. In these trainings, it can be explained that it is possible to consume less bread because it is satisfying, and that unhealthy bread and bulgur consumption is more expensive with health costs as a result. Undoubtedly, as a result of participatory breeding activities to be carried out based on local wheat varieties, yield will increase and costs will decrease, which will lead to a decrease in the prices of these products in the long run. However, at this stage, flour of some local wheat varieties such as siyez and kavlıca, which have become especially famous, are sold at high prices. High selling prices at this transitional stage have a positive effect on the dissemination of cultivation of these varieties, but gentrification is detrimental in the long run. It is not widely possible for low-income large segments of population to consume bread made from local wheat in Turkey's economic conditions at this stage. In order to reach this stage, the above-mentioned developments must be achieved.

Against the discourse of feeding the world: The discourses that the ecological production of local wheat varieties cannot feed the world are very common at all levels. It should be explained that local wheat varieties are more nutritious and satisfying, and it may not decrease the production to use agroecological methods. It should be emphasized that by improving pastures, a significant part of the grain that goes to feed use can be allocated to human nutrition. It is necessary to bring together experts and movements related to agroecology and participatory breeding to work together.

Against compartmentalized thinking: Different issues such as consumption, production, health, and the global climate crisis are not approached with in an integrated manner but are discussed in separate sections. The topics of agroecology, participatory plant breeding and holistic food systems; should enter the fields of education and research. It would be beneficial for local governments to contribute to the establishment of organizations like Masipag.

Against short-term thinking: Food planning processes and food policies should be developed and integrated at all levels. The prominence of food and seed sovereignty approaches can be supported.

Changing the criteria for the measure of success: It can be demonstrated that local wheat varieties may not fail by discussing criteria such as the emphasis on the measurement of nutrients per hectare and the output at the farm level instead of yield per hectare in wheat.

4. Conclusions

Local wheat varieties still exist in Turkey, where wheat was first cultivated and has rich wild ancestors. Conservation of these varieties is of vital importance for the whole world. The increase in the use of agricultural chemicals in the green revolution and the wheat varieties developed with the breeding programs of international research institutes have led to the decline of local wheat varieties in Turkey, which is in danger of extinction. There are critical researches that these new modern wheats pose serious problems in terms of nutrition. These developments also caused farmers to lose seed sovereignty. Farmers have become dependent individuals who buy their seeds from companies, spend a considerable amount of their money on industrial inputs, forget their knowledge of ecological production and as a result, lose their autonomy.

The success factors of the leading farmer/consumer communities and food groups aiming at the ecological production of local wheat varieties and the consumption of their products such as bread and bulgur were tried to be revealed with this study.

In this research, it has been inferred that the farmer/consumer communities that are more successful in producing local wheat varieties and especially intensifying them in a certain area have the following characteristics and these

factors lead to success:

- They establish closer relations with the farmers in their region
- They assist farmers in providing seeds of local wheat varieties
- They give women a greater importance in their activities and support them
- They deal not only with wheat production, but also with other issues of the rural area, including culture, and carry out a holistic approach
- They are also interested in the sale of the product, enabling the farmer to obtain higher prices.

Farmers producing local wheat varieties have applied agroecological techniques and were happy with reduced costs and seed sovereignty. In addition, they are very satisfied with consuming their own products that are high in taste, healthy and easy to digest.

Community supported agriculture groups cooperating with these producer groups and with the farmers in their regions on bread production. However, due to high logistic costs, bread production costs were higher than industrial breads, and distribution stopped from time to time. It was not possible to ensure that all members of the food groups benefit from these breads.

The reasons why food group members prefer these breads are as follows:

- not containing toxic substances, being nutritious and satiating, being healthy
- Less waste
- Delivery to workplaces, easy access to the product
- Contributing to ecology, enriching biodiversity, supporting peasants

The reasons for those who do not prefer these breads are as follows:

- More expensive
- Sometimes hard
- Unusual taste
- Not being provided regularly

The numbers of pioneer groups, farmers and new peasants which produce local wheat varieties are increasing in Turkey. Some well-known ancient wheat varieties are sold at very high prices, while other local varieties can be sold at better prices than modern wheats.

Progressive municipalities organized or contributed to seed exchange festivals, established seed centers, distributed seed and other seedlings and as a result accelerated the spread of local wheat varieties. There is a need for some interventions by municipalities and public institutions to promote bread made with local wheat, wheat derived from local wheat and sourdough. These can be listed as follows:

- Supporting the production and consumption of bread and bulgur made with local wheat and sourdough through price and taxation. For this purpose, financing cooperatives to make purchases can be considered.
- Municipality and public sector to establish a bread factory and purchase local wheat produced in an agroecological system.
- Purchasing these products to be used in official institutions, schools, army cafeterias, to help the poor people.
- Supporting research studies for the production of local wheat and sourdough bread and other products within the agroecological agricultural system.
- Develop new criteria and standards for sustainable wheat and bread production and strictly enforce them in wheat production and bread production.

Industrial agriculture has created some path dependencies which is limiting local wheat varieties. The lack of seeds

of local wheat varieties, the unsuitability of existing flour production machines, the difficulties in ecological production can be overcome with the support and training activities of municipalities. Participatory wheat breeding studies, in which farmers are appreciated as equal stakeholders, will increase the yield, and will contribute to the solution of some problems. Currently, professional plant breeders stay away from this subject and do not support it, and even a significant part of them is not even informed of it. In this regard, there is a need for pioneering organizations to cooperate with plant breeders. When these studies are carried out, problems such as yield, and high bread cost will be solved significantly.

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Ethical Statement

There is no need to obtain permission from the ethics committee for this study.

Conflicts of Interest

There is no conflict of interest between the article authors. "We declare that there is no conflict of interest between us as the article authors.

Authorship Contribution Statement

The idea of the original draft belongs to TÖ. The introduction, material, and methods sections are written by MYY. Research findings and conclusion sections are written by MYY and TÖ. MYY did data collection. MYY and TÖ constructed together the research area section in the study. The manuscript is reviewed and edited by MYY and TÖ. Both of the authors read and approved the final manuscript.

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