SUSTAINABLE FOOD SYSTEMS COUNTRY REPORT

TÜRKİYE - 2021

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USA	United States of America
AFF	Ataturk Forest Farm
R&D	Research and Development
AT	Action Track
BLD	Balancing Land Degradation
BESD-BIR	Turkish Poultry Meat Producers and Breeders Association
PGRs	Plant Growth Regulators
BISAB	Sub-Union of Plant Breeders
UN	United Nations
DGPP	Ministry of Agriculture and Forestry, Directorate General of Plant Production
CFS	Committee on World Food Security
CIMMYT	International Maize and Wheat Improvement Centre
CIMER	Presidency Communication Centre
ÇAYKUR	Directorate General of Tea Enterprises
GDCDE	Ministry of Environment, Urbanization and Climate Change, General Directorate of Combating Desertification and Erosion
FRS	Farmers Registry System
da	Decare
DEMIS	Dynamic Erosion Model and Monitoring System
DİTAP	Digital Agriculture Market
DKMP	General Directorate of Nature Conservation and National Parks
DGSHW	Ministry of Agriculture and Forestry Directorate General of State Hydraulic Works
EBA	Ecosystem-Based Adaptation to Climate Change in Steppe Ecosystems
EFFIS	European Forest Fire Information System
EMRA	Energy Market Regulatory Authority
FAO	Food and Agriculture Organization of the United Nations
FAO-SEC	Food and Agriculture Organization of the United Nations Subregional Office for Central Asia
FIDEBIRLIK	Sub-Union of Seedling Growing
FTPP	FAO-Türkiye Partnership Programme on Food and Agriculture
FTFP	FAO-Türkiye Partnership Programme on Forestry
SUSM	Sub-Union of Sapling Manufacturers
SES	Solar Energy Systems
DGFC	Ministry of Agriculture and Forestry, Directorate General of Food and Control

GMOs	Genetically Modified Organisms
GSP	Global Soil Partnership
GDP	Gross Domestic Product
ha	Hectare
ICARDA	The International Centre for Agricultural Research in the Dry Areas
IGC	International Grains Council
IGR	Insect Growth Regulator
IOFS	Islamic Organization for Food Security
ILO	International Labour Organization
ILOSTAT	International Labour Organization Statistics
IPA	Instrument for Pre-Accession Assistance
IPARD	Instrument for Pre-Accession Assistance for Rural Development
ISF	International Seed Federation
IWWIP	International Winter Wheat Improvement Programme
IDEBIS	Climate Change Information System
COMCEC	Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation
OIC	Organization of Islamic Cooperation
GAP	Good Agricultural Practices
KAMAG	TUBITAK Public Research Support Group
BSEC	Black Sea Economic Cooperation
MoNE	Ministry of National Education
MILGES	National Solar Energy Plant
OECD	Organisation for Economic Cooperation and Development
WES	Wind Energy System
SLM	Sustainable Land Management
WFD	Water Frame Directive
MoIT	Ministry of Industry and Technology
SDG	United Nations Sustainable Development Goals
SSI	Social Security Institution
STATPUB	Canada Pulse Research Database
SOFI	The State of Food Security and Nutrition in the World
SUSBIR	Sub-Union of Ornamental Plants Producers
TAD PORTAL	Agricultural Land Assessment and Information Portal
DGARP	Ministry of Agriculture and Forestry Directorate General of Agricultural Research and Policies
DGARP-SUET	Irrigation Management and Plant Water Consumption Calculation System

TARBIL	Agricultural Monitoring and Information System
TARSIM	Agricultural Insurance Pool
TARMAKBIR	Turkish Association of Agricultural Machinery and Equipment Manufacturers
TEPGE	Ministry of Agriculture and Forestry, Strategy Development Department, Agricultural Economic and Policy Development Institute
DGAE	Ministry of Agriculture and Forestry Directorate General of Agricultural Enterprises
TIM	Turkish Exporters Assembly
TIMER	Agricultural Communication Centre
ARDSI	Agriculture and Rural Development Support Institute
MoAF	Ministry of Agriculture and Forestry
TODAB	Sub-Union of Seed Distributors
DGAR	Ministry of Agriculture and Forestry Directorate General of Agricultural Reform
TSÜAB	Sub-Union of Seed Industrialists and Producers
TURKSTAT	Turkish Statistical Institute
Türkpatent	Turkish Patent and Trademark Office
TÜRKTOB	Türkiye Seed Growers Association
TURKVET	Animal Record Keeping System
TYAB	Sub-Union of Seed Growers
UTAC	Union of Turkish Agricultural Chambers
UDREMIS	National Dynamic Wind Erosion Model Monitoring System
NRMP	National Residue Monitoring Programme
BM	United Nations
UNCBD	United Nations Convention on Biological Diversity
UPOV	International Union for the Protection of New Varieties of Plants
USD	United States Dollar
USDA	United States Department of Agriculture
WHO	World Health Organization
CoHE	Council of Higher Education
PPRI	Plant Protection Research Institute

PREFACE

In recent years, our world is facing a series of global issues that cause food insecurity. Many factors, such as fluctuations in food prices, increasing population and increasing demand for food, changing consumption habits, climate change and its effects on agricultural production, limitation of natural resources, decrease in water resources, rapid urbanization and migration from rural areas to the urban, inadequacy of logistics infrastructure and in recent times, the effects of Covid-19 on the food supply, affect food security on a national and global scale.

The world population is expected to reach 10 billion by 2050. Food crises, which are a big problem for humanity, have become threatening 1 out of every 10 people with Covid-19. On the one hand, there are about 650 million people struggling with obesity, on the other hand, there are more than 2.3 billion people who do not have access to nutritious and adequate food. Excessive use of limited natural resources in the production of food necessary for nutrition, unconscious and wrong practices threaten the world we live in by causing many problems from environmental pollution, threats on biodiversity, the decrease and pollution of water resources, plant and animal health and public health. On the other hand, 1.3 billion tons of food, which corresponds to approximately one third of the food produced for human consumption, is lost and wasted due to social, economic, environmental and, most importantly, climate change-related problems. Considering that approximately one third of the earth's land is degraded, biodiversity is threatened due to deforestation, desertification, erosion and other human-induced effects, and considering that climate change also aggravates these problems and we need food to live, it becomes imperative that we transform our existing food systems, which have limits, in global and national scale and make it sustainable.

The Sustainable Development Goals (SDGs) adopted by all Member States of the United Nations (UN) in 2015; aim to eliminate social, cultural and ecological issues consisting of 17 main topics such as ending hunger and poverty all over the world, combating climate change, ensuring gender equality, promoting quality education, responsible production and consumption by 2030. Food system is defined as a system that covers the activities related to production, processing, transportation and consumption and covers all elements related to the outputs of these activities, including the environment, people, inputs, processes, infrastructure, institutions, markets and trade, food consumption and socio-economic and environmental consequences. Sustainable Food Systems, on the other hand, is one of the most important tools in achieving the SDGs.

In this regard, I would like to emphasize that we appreciate the Pre-Summit Meeting held by UN on 26-28 July 2021, Food Systems Summit on September 23-24, 2021 and all national efforts and initiatives carried out in this direction, to ensure access to safe and nutritious food for the achievement of 17 SDGs by 2030, to increase sustainable consumption and production, and to build resilience against food security gaps, taking into account the Covid-19 pandemic.

Türkiye has implemented many studies and projects to transform food systems for a while. While implementing these studies, it attaches special importance to the development of international cooperation as well as national studies.

The most important studies that form the basis of the national pathway we prepared within the scope of the UN Food Systems Summit include our Sustainable Food Systems Country Report, which presents the current situation in Türkiye's food systems, the Online Survey and the Final Report of the National Workshops that analyses the work we have done with stakeholders and shows the results, Official Feedback Forms which are requested by the UN

and are accessible from the official website of the Summit.

For a more prosperous society, our country has shaped the pathway with stakeholder views in making agricultural lands and food systems sustainable, which cover approximately one third of the total surface area of 78 million hectares. Türkiye's pathway handles many subjects such as access to nutritious, sufficient and safe food at reasonable prices for everyone without leaving anyone behind, reducing food loss and waste, food banking, school feeding programs, increasing sustainability and competitiveness in agriculture, livestock and aquaculture sectors, ensuring food security against future crises and emergencies caused by climate change and natural disasters .

In addition, combating climate change and drought, reducing water pollution, expanding the use of renewable energy sources, protecting biodiversity and producing in harmony with nature, developing R&D infrastructure and accelerating digital transformation, employment of women and youth in agriculture and food sector and developing decent job opportunities, the dissemination of e-commerce applications and land banking are also indispensable issues for the improvement of sustainable food systems, and these issues are also included in our national pathway.

In the transformation of our food systems, there is a need for national, regional and global cooperation, especially with the United Nations. In this regard, we attach great importance to the development of cooperation on a regional and global scale. In the process of transforming food systems, we will do our part in cooperation and coordination with all our stakeholders, from the public, local governments, the private sector, civil society, unions and professional chambers, to our farmers and consumers.

On this occasion, I would like to express my gratitude, deepest respect and love to our producers, the UN Food Systems Summit Secretariat, the UN Türkiye Organizations, our national stakeholders and the representatives of our Ministry, and I wish that this work prepared under the coordination of my Ministry will be beneficial to our nation.

Dr. Bekir PAKDEMİRLİ

Minister of Agriculture and Forestry

PREFACE

In order to achieve the 17 Sustainable Development Goals by 2030, the United Nations (UN) held Pre-Summit Meeting on 26-28 July 2021 and Food Systems Summit on September 23-24, 2021, to ensure access to safe and nutritious food, increase sustainable consumption and production, and build resilience against food security vulnerabilities, taking into account the COVID-19 pandemic. Within the scope of the Summit, which took about 1.5 years to prepare, more than 1600 global dialogues were held, more than 100 thousand participants contributed to the work, and more than 100 countries, including our country, prepared their national roadmaps to transform their food systems and contribute to the achievement of Sustainable Development Goals by 2030, as in the UN 2030 Agenda.

In this direction, the UN requested the member states to designate a National Dialogue Coordinator to carry out the national dialogue process and to ensure coordination among food systems stakeholders across the country. National stakeholders also came together with a participatory and inclusive approach in order to determine national priorities as well as to bring together global stakeholders for the work carried out on a global scale under the 5 action tracks determined by the United Nations. Within the scope of the Summit, the task of national coordination on behalf of our country was assigned to the Ministry of Agriculture and Forestry, and I was appointed as the National Dialogue Coordinator. Our country made a global contribution to the AT 2 (Shift to Sustainable Consumption Pattern and Shocks, Vulnerabilities) and AT 5 (Build Resilience to Vulnerabilities, Shocks & Stresses) among these five action tracks, but the national dialogue process was carried out for all action tracks as well.

However, our country has started its work on the transformation of food systems with the Sustainable Food Systems Country Report prepared in 2019, long before the Summit, and the 3rd Agriculture Forest Council, the results of which were announced to the public by our Esteemed President Recep Tayyip ERDOĞAN. More than 1300 Council Members came together under 21 Working Groups, which cover all elements of sustainable food systems with around 50 thousand ideas representing civil society, academia, public and private sector, professional chambers, farmers and the public, by working with common sense; 46 main actions and more than 300 sub-actions that shed light on the future have been implemented. A similar process was also carried out for the Water Council. In 11 different working groups, 1,631 participants discussed for 7 months and the opinions of the citizens were taken after creating the web page susurasi.gov.tr.

In this context, our Sustainable Food Systems Country Report, which was prepared in 2019, was updated with the views of key stakeholders within the scope of the UN Food Systems Summit, and our country has started the road one step ahead of time as part of the preparations for the 3rd Agriculture and Forest Council and Water Council, which is carried out with a wide stakeholder group.

Türkiye has committed to implement the results of the 3rd Agriculture and Forest Council and Water Council in the National Pathway prepared within the scope of the UN Food Systems Summit. In addition to these, more than 500 problems under 5 action tracks for the transformation of food systems, with an online survey applied to stakeholders representing civil society, academia, public and private sector, professional chambers, farmers and the public, and two workshops held at the national level, more than one thousand solution and action proposals were identified and provided a strong foundation for the national pathway preparation process. In addition, our country carried out a regional workshop for the member countries of the Black Sea Economic Cooperation Organization and the Economic Cooperation Organization, and played a leading role in determining possible coalition and cooperation areas in order to make food systems sustainable.

It will undoubtedly be unrealistic to make progress without revealing the current situation. In this context, with the Sustainable Food Systems Country Report, Türkiye's current situation in environmental, economic and social food systems has been revealed, many topics from natural systems and resource availability, socio-economic structure and basic indicators, food security, plant, animal and aquatic products production agricultural production, food processing industry and important programs and projects for sustainable food systems have been discussed. This report has been an important pillar in defining the National Roadmap and transforming Türkiye's food systems by 2030. In summary, with the Sustainable Food Systems Country Report, Online Survey and Final Report of National Workshops, Official Feedback Forms that it has prepared, our country provided input to Türkiye's National Pathway and targets and actions, defined and finalized its national roadmap, the responsibility and intervention areas of stakeholders in the transformation of food systems, with stakeholder views, with a participatory and inclusive approach. Finally, our country attaches great importance to carrying out studies on the international as well as national scale in the development of sustainable food systems.

I would like to take this opportunity to thank all our stakeholders, and I hope that this study, which is an important guide in contributing to the achievement of the Sustainable Development Goals by 2030 and in the transformation of food systems within the scope of the UN Food Systems Summit, will be beneficial for our country.

Aylin ÇAĞLAYAN ÖZCAN
National Dialogue Coordinator
Director General for European Union and Foreign Relations
Ministry of Agriculture and Forestry

EXECUTIVE SUMMARY

Today, our world is facing a series of global issues that cause food insecurity. According to the 2020 SOFI Report by FAO, prior to the COVID-19 pandemic, almost 690 million people were undernourished. With the onset of the pandemic in 2019, close to 750 million - or nearly one in ten people in the world - were exposed to severe levels of food insecurity. Furthermore, over 2 billion people in the world lack regular access to safe, nutritious and sufficient food. If this trend continues, the number of undernourished people will exceed 840 million by 2030, risking SDG Target 2. According to UN data, the world population which was 7.8 billion in 2019 is expected to reach 10 billion by 2050, and the size of agricultural land per capita is expected to drop from 2.0 decares (ha) to 1.6 da. Accordingly, food production needs to be increased by 50% until 2050.

Food security on national and global scales is affected by various factors such as fluctuating food prices, growing population and demand for food, changing consumption habits, global conflicts and economic fluctuations, increasing prices of agricultural inputs, climate change and its impacts on agricultural production, limited natural resources, agricultural production affected by land degradation and efficiency of natural resources, decreasing water resources, rapid urbanization and abandonment of rural areas, insufficient logistics infrastructure, and the recently increasing impacts of COVID-19 on food supply. Accordingly, the solution of current problems and achievement of the United Nations (UN) 2030 Agenda for Sustainable Development Goals require addressing food systems with a holistic and coordinated approach. Sustainable food systems guarantee economic, social and environmental well-being for future generations in addition to serving as a useful instrument for ensuring food security and nutrition for all in the future.

The United Nations agreed to organize in 2021 a Sustainable Food Systems Summit with a view to strengthen the 2030 Agenda and Sustainable Development Goals. The Summit, planned for September 2021, aims to: i) ensure access to safe and nutritious food for all, ii) boost sustainable consumption and production, and iii) build resilience to food security gaps. Furthermore, a Preliminary Summit Meeting was held between 26-28 July 2021 in Italy, chaired by the UN Secretary-General António Guterres and Italian Prime Minister Mario Draghi for Summit preparation purposes and Sustainable Food Systems Summit was organized on Sep 23-24, 2021. As part of the Summit preparations, the UN required member states to designate a National Dialogues Convenor to carry out the national dialogue process. Ms. Aylin ÇAĞLAYAN ÖZCAN, Director General for the European Union and Foreign Relations of the Ministry of Agriculture and Forestry, was designated as the National Dialogues Convenor on behalf of the Republic of Türkiye under the Summit.

Five Action Tracks were established by the UN in the preparatory process for the Summit:

ACTION TRACK 1	Ensure Access to Safe and Nutritious Food for All
ACTION TRACK 2	Shift to Sustainable Consumption Pattern
ACTION TRACK 3	Boost Nature Positive Production at Sufficient Scale
ACTION TRACK 4	Advance Equitable Livelihoods
ACTION TRACK 5	Build Resilience to Vulnerabilities, Shocks & Stresses

Contributions are made by Türkiye to AT2 and AT5 ("Action Track 2 - Shift to Sustainable Consumption" and "Action Track 5 - Build Resilience to Vulnerabilities, Shocks & Stresses) on a global scale. However, the national dialogue process was carried out for all 5 of the Action Tracks.

To that end, the report established the current national situation in terms of the constituent parts and topics of sustainable food systems. Moreover, the most important problems, proposed solutions and concrete commitments with regard to improving/advancing sustainable food systems at the local and national levels were determined by stakeholders including the public and private sectors, NGOs, academia, chambers of profession, producers and young people, and a separate final report was drafted. Further information regarding the Summit is available at https://www.un.org/en/food-systems-summit.

According to official statistics, the population of Türkiye which stands at 83,614,362 in 2020 is expected to grow by approximately 27% by 2050 to reach 105 million. The share of agriculture in Gross Domestic Product, which was 189 billion TRY in 2017, surged to 277 billion TRY in 2019 and 377 billion TRY in 2020. According to the World Bank data, the rate of the urban population in Türkiye in 2018 was 75.1%. The total number of people who have been employed at national level since 2020 is approximately 26.8 million. 17.6% of people employed in total employment rate (4,716,000 people) are involved in the agricultural sector. Among the economic activities, agriculture is one of the important sectors. Türkiye ranks 17th in the world in terms of the agricultural sector, and among the top 10 countries in terms of agricultural economic size.

As an integral part of sustainable food systems, the agricultural organizations in Türkiye appear in the forms of cooperatives, producer and irrigation unions, farmer associations and professional agricultural associations. Currently, 3.5 million producers are members of cooperatives. The Central Union of Agricultural Credit Cooperatives of Türkiye is Türkiye's largest farmer organization, with its 17 Regional Unions, 1,615 cooperatives, 200 service bureaus, 19 companies, approximately 10 thousand employees, 35 billion TRY asset size and more than 800 thousand partners.

Within the period of 1999 to 2020, a significant surge was observed in the annual crop production in Türkiye, with approximately 2.5 million tons in wheat, 640,000 tons in rice, and 8.3 million tons in total cereal production. The same period also saw an increase of 1.4 million tons in total oil seed production and 4.2 million tons in tomato production. Our country ranks 1st in Europe and 4th in the world in terms of geothermal energy installed capacity, according to the end of 2020 data. In our country, the amount of greenhouses heated with geothermal energy is 4.344 decares.[1] According to TURKSTAT data, greenhouse cultivation saw an increase of over 5 million tons during the said period. Considering the existence of various resources that are yet undiscovered, this indicates that Türkiye has significant potential.

In the period of 2002-2020, tea production in Türkiye grew from 792 thousand to 1.4 million tons (1,450,556 tons); grape production from 3.5 million to 4.2 million tons; orange production from 1,250,000 to 1,333,975 tons; mandarin production from 590 thousand to 1.6 million tons; lemon production from 525 thousand to 1.2 million tons; and banana production from 95 thousand to 728 thousand tons.

In addition to ranking among the best performers in agricultural production in the world, Türkiye is also the world leader in the production of various agricultural products. Türkiye currently ranks first in hazelnut, cherry, fig, apricot and quince production; second in melon and carob production; and third in mandarin, apple, cucumber and watermelon production. It is also among the world's leading producers of walnut, olive, tomato, Antep pistachio, strawberry, lemon and bean. Türkiye is a net exporter of agricultural products. Despite the changes in the product diversification of agri-food foreign trade, certain products such as processed fruits and vegetables, flour (1st rank in world flour exports) and pasta (2nd rank in world pasta exports) still remain important in exports.

In the last 17 years, seed production increased 8 folds, reaching up to 1,242 thousand tons in 2020. The production of certified seedling/sapling, which was 4 million units in 2002, increased by approximately 48 times to reach 192 million in 2020. Today, 96% of the seedlings and saplings that are used in fruit production are domestically

1 https://www.tarimorman.gov.tr/SGB/TARYAT/Belgeler/Projeler/jeotermal%20serac%C4%B1l%C4%B1k%20fizibilite%20raporu%20ve%20yat%C4%B1r%C4%B1mc%C4%B1%20rehberi.pdf

produced and certified. Local seeds, which are our national heritage, are kept in Seed Gene Banks. Additionally, the Atadan Toruna Seed Campaign was launched to promote domestic and national production.

With regard to animal production, Türkiye has seen a surge in the bovine animal population in recent years. According to TURKSTAT data, there are nearly 18.2 million cattle (cows and water buffalos) in Türkiye. Cattle population comprises 48.5% culture breeds, 41.8% hybrid breeds, and 9.7% native breeds. There are 6 local cattle breeds (Boz Breed, Native Black, Eastern Anatolian Red, South Anatolian Red, Zavot, Native South Yellow) and 1 native water buffalo breed (Anatolian Water Buffalo) that have been registered. Native cattle breeds are characterized by their ability to endure extreme climate conditions and adapt to geographical conditions.

With its natural conditions, agricultural structure, and traditions, Türkiye is a very suitable country for widespread ovine breeding. Ovine-caprine animal breeding in Türkiye plays an important role in livestock breeding. Accordingly, Türkiye is in a leading position in Europe and among the top 10 countries in the world with nearly 42.1 million heads of sheep and 11.7 million heads of goat (a total of 54,113,000 sheep and goat). Türkiye has registered 33 local sheep breeds (Karayaka, Herik, Gokceada, Karakul, Red Karaman, White Karaman, Kivircik, Awassi, Daglic, Cine Capari, Hemsin, Norduz, Sakiz, etc.) and 6 goat breeds (Angora Goat, Kilis Goat, Hair Goat, Norduz Goat, Honamlı Goat, White Goat). Local breeds have low breeding costs and tend to have high vitality and an ability to adapt to poor environmental conditions.

Another sector in which Türkiye is competitive is meat and egg poultry farming. Türkiye ranks amongst the world's top 11 countries in terms of chicken population and ranks second in Europe in terms of poultry production. The population (including producers, farmers, sector-related tradespeople and feed, medicine, sub-industry, transportation, marketing sectors) that makes a living from the poultry sector, which is among the fastest-growing and strongest sectors in national agriculture, is nearly 1.5 million.

Located at the intersection point of three different bio-geographical regions, i.e. Europe-Siberia, Mediterranean and Iran-Turan, Türkiye is home to a plant diversity of around 12,000 species, one-third of which are endemic. The unique geography of Anatolia enables plants to bloom in different regions at different times of the year, rendering Türkiye an ecologically suitable country for beekeeping. Accounting for 90% of the total production, Türkiye has the largest share in world pine honey production.

According to FAO data, Türkiye ranked 2nd after China in terms of colony size and 109,330 tons of honey production in 2019. Additionally, Türkiye ranks first in Europe in terms of its colony size and honey production.

Türkiye is also extremely rich in marine species. The Black Sea in the north with cold and low-saline water, the Mediterranean in the south with warm and highly saline water, and the Marmara Sea, where these two seas intersect to form an inland sea, create suitable ecosystems that enable various marine species to co-exist.

Türkiye's fish production was 785,811 tons in 2020, comprising 37.2% marine fish, 5.0% other marine products, 4.2% inland sea products, and 53.63 % aquaculture products. Fishery production was 364,400 tons, while aquaculture production was 421,411 tons.

Türkiye ranks 7th in agricultural production in the world. Due to its strength in this area, it is no surprise that the Turkish food and beverages sector is one of the most attractive areas for foreign investors. Since it offers profitable investment opportunities to global investors, foreign direct investments amounting to 89.5 billion USD have been made in the sector since 2010.

On the other hand, water is vital for human life and the ecosystem as well as a fundamental requisite for countries to develop. The critical importance of access to clean water and sanitation was proven once again during the COVID-19 pandemic. Today, water scarcity has become a more common and growing problem than ever before, with water quality rapidly deteriorating in almost every country, leading to various economic and social problems. Unconscious and unplanned use of water and the extreme withdrawal in groundwaters, in particular, directly affect groundwater quality and quantity as well as soil quality.

In this regard, it is crucial to expand modern irrigation systems by transforming the conventional irrigation systems into pressurized irrigation systems in Türkiye, where agricultural lands cover nearly one-third of the total surface area of 78 million ha. The total potential irrigable area in Türkiye is 8.5 million hectares. As of 2020, Türkiye aims to reach 6.7 million ha out of this potential by building an irrigation infrastructure. At present, there are 2,743 irrigation plants in operation in the country.

Türkiye also has a rich ecological diversity. Afforested land in Türkiye was 20.8 million hectares in 2002, which increased to 22.6 million hectares in 2019. It is planned to increase to 23.4 million hectares in 2023. In this framework, November 11 was declared as National Afforestation Day by President Recep Tayyip ERDOĞAN in 2019 in order to protect forests that have a great economic, ecological and social importance, ensure their sustainable management, make Türkiye healthier and livable for future generations. In the first year of the national day and in the context of the Campaign called Breath for the Future [2], 11 million saplings were aimed to be planted and approximately 13.5 million saplings were planted with the support of Turkish citizens. In 2020, saplings were planted, not only in our country but together with representatives from over 60 countries. In fact, Türkiye set a 'world record' for planting the most saplings within an hour, making it to the Guinness Book of Records. According to OECD data, Türkiye ranks 3rd in the increasing presence of forests in the world.

Türkiye is located in a region that is vulnerable to forest fires. Having experienced severe forest fires in the past, Türkiye has been working on improving its firefighting techniques, aiming to gradually reduce response time to fires from 12 to 10 minutes in the near future. According to EFFIS (European Forest Fire Information System) data, Türkiye is the most successful country in its region in fighting against forest fires.

Türkiye is at the risk of desertification and drought due to its climatic characteristics and topographical structure. In addition to the lands in our country, 65% of which are arid and semi-arid, being susceptible to erosion, the increasing demand and pressure for natural resources by the growing population is one of the most significant causes of desertification/land degradation. While the quantity of soil transported through erosion was 500 million tons per year in 1970 in Türkiye, this rate was reduced to 140 million tons in 2020 as a result of the rehabilitation works carried out by the Ministry of Agriculture and Forestry (MoAF) organizations such as afforestation and erosion control, afforestation of catchments, improving pasturelands, preventing excessive grazing, commissioning advanced irrigation technologies in agricultural areas, etc. Based on the results of the erosion forecast model and monitoring system developed by the MoAF, is aimed to reduce this rate to 130 million tons per year by 2030 in line with additional measures to be taken in agricultural, forestry and pasture lands.

Maintaining cooperation with various international organizations, and notably the UN, in agriculture, food and forestry as well as improving sustainable food systems, Türkiye has been hosting various cooperative efforts at regional and office levels. In this framework, through the partnership programmes carried out with international organizations, Türkiye shares its know-how and experience on relevant subjects with a wide region ranging from Central Asia to the Balkans, Caucasia and Africa.

The most prominent international activities carried out by Türkiye to contribute to the improvement of sustainable food systems can be listed as follows:

- Hosting the Türkiye-Africa 1st Agriculture Ministers Meeting and Agribusiness Forum in 2017,
- Hosting the 2nd Meeting of the Black Sea Economic Cooperation (BSEC) Ministers of Agriculture themed "Sustainable Food Systems and the Future of Aquaculture" in May 2017,
- Establishing the "Technical Platform on the Measurement and Reduction of Food Loss and Waste", which was ratified in the "G20 Leaders' Declaration" during Türkiye's G20 Presidency in 2015,
- Launching an international campaign titled "SAVE YOUR FOOD" on 20 May 2020 to reduce food loss and waste at the national and international level, in coordination with the Ministry of Agriculture and Forestry

2 Detailed information can be obtained from https://gelecegenefes.com/.

and cooperation with the Food and Agricultural Organization; breaking the Guinness world record for "the campaign with the most pledges in the world on environmental sustainability" with 790,000 pledges made through the "Make a Pledge to Break the Record!" movement,

- Becoming a donor country under the FAO Türkiye Partnership Programmes (FTFP and FTPP) and hosting the FAO-Subregional Office for Central Asia (FAO-SEC),
- Establishing the "BSEC Sustainable Food Systems Regional Cooperation Centre" in cooperation with FAO and Organization of the Black Sea Economic Cooperation and undertaking the role of country coordinator of the Working Group on Agriculture and Agro-industry for the last two terms,
- Taking on the Chairmanship of the General Assembly of the Islamic Organization for Food Security (IOFS) this year and carrying out its Executive Board membership,
- Hosting IFAD's sub-regional office in Istanbul for enhanced cooperation among Azerbaijan, Bosnia and Herzegovina, Georgia, Kyrgyzstan, Lebanon, Moldova, Tajikistan, Türkiye and Uzbekistan,
- Strengthening food systems and vulnerable value chains related to agriculture and forestry through the Ministry of Agriculture and Forestry Programmes carried out in coordination with MoAF and FAO,
- "Food Loss and Waste Reduction Project" that is expected to be launched in 2020, covering Central Asian countries (Türkiye, Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan),
- Boosting Restoration, Income, Development, Generating Ecosystem Services, also known as Building BRIDGES between Türkiye and Africa's Great Green Wall Project, which is being implemented in Sudan, Mauritania and Eritrea since 2019,
- Establishing the "Regional Coordination Centre for Food Security" under the Organization for Economic Cooperation,
- "Agriculture Forest Council was established in order to enable negotiations by and among authorities and representatives and make decisions to assist the formulation of agricultural development strategies with a view to improving agriculture and livestock breeding in Türkiye; implementing, extending and improving new technologies; determining the problems, and the solutions thereof, encountered in services related to agriculture and livestock. The 3rd Agricultural Forest Council was held between 18-21 November 2019 in Ankara following nearly 4 months of work, with the attendance of the academia, NGOs, private sector representatives, farmers as well as subject-matter experts from the Ministry of Agriculture and Forestry and other relevant public agencies. Under the 3rd Agriculture Forest Council Meeting, 21 Working Group were established at the Commission level, shedding light on the future of agriculture and forestry in Türkiye by receiving over 20,000 opinions from over 1,300 participants. All information and documentation regarding the Council Meeting are available at http://www.tarimormansurasi.gov.tr/; including the goals set at the Commission level, the publicly announced conclusion statement and concrete actions including commitments. 46 main actions and their sub-actions, which were determined by the Ministry of Agriculture and Forestry in early 2020 based on the outcomes of the 3rd Council of Agriculture Meeting, shall be monitored on a quarterly basis by the end of 2023 and the application results announced to the public". In this regard, the outputs of the 3rd Council of Agriculture [3] are among the most important inputs under the Summit preparations carried out at the national level. 1st Water Decleration was organized in 2021 as well.

In the recent period, countries have been exposed to the COVID-19 pandemic which has left significant impressions on food supply on a global scale. Türkiye did not have any difficulty with food supply during the COVID-19 pandemic. To maintain agricultural production uninterruptedly, Türkiye operated the participatory process on a national and local scale with a visionary approach and took many measures in cooperation with many institutions

3 http://www.tarimormansurasi.gov.tr/ Detailed information can be obtained from https://gelecegenefes.com/.

and organizations in a timely manner. Türkiye succeeded to minimize the impacts of COVID-19 pandemic on food and agricultural sectors. Various projects are implemented by Türkiye to strengthen the women involved in the supply chain and guide young people towards the agricultural sector. Expert Hands is only one of the projects implemented to bring young people into the agricultural sector.

For the improvement of Sustainable Food Systems, in addition to the actions of the 3rd Agriculture Forest Council, among others, on a national scale, the following topics will be concentrated: [4]

- **Protection of Environment and Natural Resources and Sustainable Use of Them** by combating climate change, using water resources efficiently and preventing the pollution, ensuring the sustainability of natural resources
- **Transition to Sustainable Consumption and Prevention of Food Loss and Waste** by reducing food loss and waste
- **Ensuring Public Health and Food Safety** by producing reliable, healthy and nutritious food, strengthening audits and controls on ensuring public health and food safety, addressing other topics related to food safety
- **Inclusive Sustainable Food Systems and Poverty Reduction** by mitigating rural-to-urban migration, developing fair livelihoods, improving income distribution for the poor
- **Increasing the Resilience of Sustainable Food Systems to Food Crises,** which requires international response as well as national
- Improving the necessary infrastructure and human capital to achieve a **digital transformation** in agriculture.

In conclusion,

Efforts are made to implement many measures in the next period for implementing many measures such as:

- Providing healthy nutrients and safe food at reasonable prices reviewing measures against income loss and disruptions to food supply due to loss of livelihoods as a result of COVID-19 and strengthening food safety for other emergencies, ensuring supply resilience against the future crises
- Ensuring the efficiency and sustainability of agricultural production through innovative methods, improving sustainable food systems through reliable food supply and healthy consumption
- Taking measures that will prevent price fluctuations
- Sustainable use and management of natural resources with an approach that also considers water usage for agricultural purposes
- Ensuring the sustainability in agriculture and protecting competitiveness by minimizing the impacts of climate change and drought, strengthening climate change adaptation, water management and environmental resilience
- Using and promoting renewable energy resources in agriculture
- Taking measures that will strengthen producers, especially small-sized enterprises with an approach that considers gender-sensitive and disadvantaged groups, defining new funding models at production, processing, logistics, retail level

4 The final report delivered in the form of a separate document may be examined for details.

- Reducing, preventing and managing loss and waste at consumption level in food supply and supply chain
- Accelerating digital transformation in agriculture by developing innovative management models, cooperation and R&D infrastructure
- Implementing School Nutrition, School Milk and School Food Programs
- Developing and diversifying decent job opportunities in rural areas and in the agricultural and food sectors with an approach that considers vulnerable groups
- Employ the youth in the agri-food sector and prevent rural-to-urban migration
- Develop land ownership, land banking and community-based mechanisms
- Promoting e-commerce practices for virtual marketing (DITAP-Digital Agriculture Platform)
- Improve the access of smallholders, cooperatives and small enterprises to financing
- Promote the One Health approach.

1

INTRODUCTION

1.1. Sustainable Food System

According to FAO, Food Systems cover all actors involved in the production, collection, distribution, consumption and disposal of food products in agriculture, forestry and fisheries, the value-added activities associated therewith, and the parts of the broader economic, societal and natural environmentst[5].

Under Sustainable Food Systems:

- The provision of affordable, nutritious, reliable food is an essential, yet not necessarily sufficient condition for the sustainability of a food system;
- Sustainable food systems should aim to reduce food losses and waste while minimizing their current and future impact on the environment and the society;
- The balance between the integrity of agricultural ecosystems and social welfare should be seen as the core element for sustainable food systems[6] .

Food systems comprise subsystems such as agricultural, waste management, input supply and interact with other key systems such as energy, trade and health.

The concept of sustainable food is based on the production and consumption of food, which is important for human health. The sustainable food system represents a dynamic process that should contribute significantly to ensuring secure food and nutrition for future generations, which will not compromise social and environmental foundations.

Sustainable food systems are based on three pillars. They are as follows;

- Economic sustainability
- Social sustainability
- Environmental sustainability.

Sustainable Food Systems are at the heart of the United Nations (UN) Sustainable Development Goals (SDGs)[7].

- Sustainable food systems produce foods with high nutritional value for all people while preserving the ability and capacity of future generations to feed themselves.
- Sustainable food systems use their resources effectively and efficiently in almost every stage of the chain from the field to the table.
- Making use of the greatest quantity of food from every drop of water, every piece of soil, every particle of manure, and every minute of labour saves and conserves resources for the future.

In order to achieve SDGs, the global food system needs to be made more productive and restructured with a view to ensuring greater coverage of poor communities, environmental sustainability, and healthy and nutritious food for all.

The sustainable food systems approach is a way of thinking and a course of action that deals with the food system as a whole, taking into account all of its elements, relationships and relevant impacts. It is not limited to a single sector, subsystem (e.g., value chain, market) or discipline. Therefore it enhances the framing and analysis of a particular issue as a result of a complex network of interconnected activities and reactions.

Sustainability is addressed holistically in the development of a sustainable food system. In order to ensure sustainability, the development of a Food System must produce positive value simultaneously in three dimensions, i.e. economic, social and environmental.

In the economic dimension, a Food System is considered sustainable if the activities carried out by each Food System actor or support service provider are commercially or financially viable.

In the societal/social dimension, a Food System is considered sustainable when there is equality in the distribution of economic value, taking into consideration vulnerable groups classified by gender, age, race, etc.

5 Food and Agriculture Organization 2018. Sustainable Food Systems Concepts and Framework. http://www.fao.org/3/ca2079en/CA2079EN.pdf
6 https://ciat.cgiar.org/about/strategy/sustainable-food-systems/
7 https://sustainabledevelopment.un.org/?menu=1300

Essential Food System activities should contribute to the advancement of important socio-cultural outcomes such as nutrition and health, traditions, working conditions and animal well-being [8].

Environmental sustainability should be determined by ensuring that the impacts of Food System activities on the surrounding natural environment are neutral and positive, taking into account biodiversity, water, soil, animal and plant health, carbon footprint, water footprint, food loss and waste, and toxicity. The figure demonstrates sustainability in food systems as tailored by FAO.

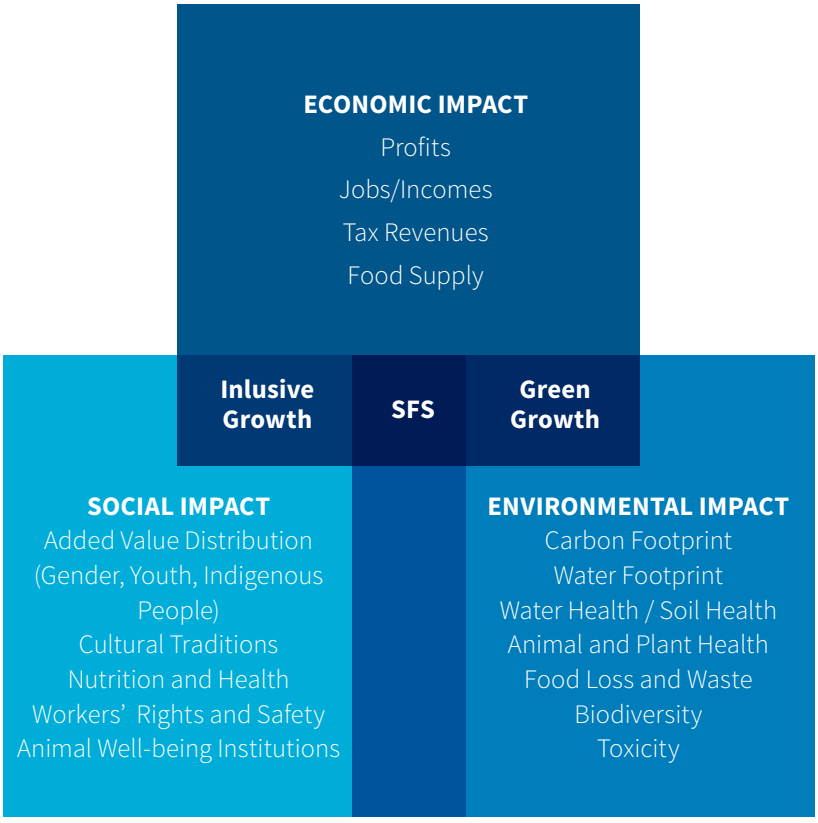


Figure 1. Dimensions of Sustainable Food Systems
Source: FAO (2014) [9]

The sustainability of a food system is influenced by interacting natural and human factors. Creating favourable conditions for transitioning to more sustainable food systems will require system-based approaches that take into account the diversity and complexity of common interactions in food production, distribution and consumption.

These connections among food production, distribution, consumption and nutritional health and the underlying socio-economic, biophysical and institutional factors ultimately affect the quantity, quality, affordability and safety of food.

Sustainable food systems require support from a wide range of stakeholders, from farmers to end consumers, governments to the private sector and civil society.

The global food system is not homogeneous; it consists of Food Systems which can be as small-scale as households or as large-scale as the national level. In

8 International Panel of Experts on Sustainable Food Systems (IPES) 2015. The New Science of Sustainable Food Systems Overcoming Barriers to Food Systems Reform.
9 High Level Panel of Experts on Food Security and Nutrition (HLPE). 2014. Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome

developing countries, for rural populations, the local Food System is the dominant system that effectively interacts with other Food Systems in one way or another. At the same time, local Food Systems differ amongst themselves in such factors as soil structure, climate, cultural norms, and gender. Sustainable food systems are protective and respectful of human well-being and social equality as well as biodiversity and ecosystems. Thus, they ensure ecosystem integrity and social well-being by providing food that is culturally acceptable, economically equitable, affordable, nutritionally adequate, safe and healthy [10].

Encouraging practitioners and policy-makers to see the big picture in improving and advancing Sustainable Food Systems will help to facilitate multi-stakeholder cooperation and policy coordination at various levels in addressing and overcoming future challenges together.

Policy measures to be defined for sustainable food systems must link food production, distribution, consumption and nutrition. Policies should also address social-economic, biophysical and institutional aspects. They should help to reduce agricultural greenhouse gas emissions, improve nutrition and strengthen value chains to ensure a transformation in agriculture and land use by enhancing agricultural productivity and gender-sensitive agricultural production, market access and adaptation, reorganization, and further desirable configurations[11].

10 IPCC, 2015: Meeting Report of the Intergovernmental Panel on Climate Change Expert Meeting on Climate Change, Food, and Agriculture [Mastrandrea, M.D., K.J. Mach, V.R. Barros, T.E. Bilir, D.J. Dokken, O. Edenhofer, C.B. Field, T. Hiraishi, S. Kadner, T. Krug, J.C. Minx, R. PichsMadruga, G.-K. Plattner, D. Qin, Y. Sokona, T.F. Stocker, M. Tignor (eds.)].World Meteorological Organization, Geneva, Switzerland, 68 pp.

11 Porter, J.R., L. Xie, A.J. Challinor, K. Cochrane, S.M. Howden, M.M. Iqbal, D.B. Lobell, and M.I. Travasso, 2014: Food security and food production systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability.
Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.) Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 485-533.

2 NATURAL SYSTEMS AND RESOURCES

2.1. General Information on Türkiye

According to TURKSTAT data, the Turkish economy grew by 1.8% in 2020; in other words, compared to the previous year, the annual Gross Domestic Product (GDP) obtained by the sum of four quarters by the production method increased by 1.8% in terms of chain volume index (2009=100) in 2020. When we examine the activities that comprised GDP; compared to the previous year, the agricultural sector grew by 4.8% in 2020 in terms of chain volume index. TURKSTAT data indicates that based on economic activity, the manufacturing industry had a share of 93.8% in exports in January 2021; agriculture, forestry and fisheries a share of 4.0%; and mining and quarrying of 1.7%. Accordingly, the agriculture, forestry and fisheries sector has a foreign trade value of 570 million USD in January 2021 based on the ISIC Rev 4 classification system. With increasing exports of agricultural products, Türkiye is among the world's largest agricultural producers. The agriculture sector, which plays a key role in social and economic terms, remains as the area of work for a significant portion of the population despite the ever-increasing high shares of the manufacturing industry and service sectors in Türkiye. The planning of future agricultural activities in the agricultural sector should take the influencing factors of land structure, climate conditions and soil structure into consideration. With its fruitful soils, land assets and structure, meteorological conditions suitable for agricultural production and its microclimatic regions, Türkiye carries favourable conditions for the cultivation of a wide variety of crops. While there is 1.5 billion ha of arable land, 4 billion ha of forestry and 3.2 billion ha of pasture in the world; Türkiye, with an overall surface area of 78 million ha, has 23.1 million ha of arable land, 22.7 million ha of forestry and 14.6 million ha of pasture. An outlook of the Turkish agricultural sector, backed by selected indicators, is presented in the following table.

Table 1. Outlook of Turkish Agricultural Sector

Indicators	Year/Source	Value
Agricultural production value: Plant production value (000 TRY)	2019/ TURKSTAT	197,455,884
Agricultural production value: Live animals value (000 TRY) *	2019/ TURKSTAT	165,318,007
Agricultural production value: Animal product value (000 TRY) *	2019/ TURKSTAT	9,391,7545
Agricultural production value: Plant production value per capita (TRY)	2019/ TURKSTAT	2,375
Agricultural production value: Live animals value per capita (TRY) *	2019/ TURKSTAT	1,988
Agricultural production value: Animal products value per capita (TRY) *	2019/ TURKSTAT	1,129
Production quantity for grains and other plant products (ton): Total	2019/ TURKSTAT	119,166,496
Land use: Total cultivated agricultural area (hectare)	2019/ TURKSTAT	19,580,744
Land use: Cultivated agricultural area / Sown (hectare)	2019/ TURKSTAT	15,398,213
Land use: Total cultivated agricultural area and permanent crops (hectare)	2019/ TURKSTAT	23,099,503
Land use: Cultivated agricultural area / Fallow (hectare)	2019/ TURKSTAT	3,387,382
Land use: Cultivated agricultural area / Vegetable (hectare)	2019/ TURKSTAT	789,906
Land use: Total area of permanent crops (hectare)	2019/ TURKSTAT	3,518,760
Land use: Permanent crops / Area of other fruits, beverage and spice crops (hectare)	2019/ TURKSTAT	2,234,144
Land use: Permanent crops / Vineyard (hectare)	2019/ TURKSTAT	405,439
Land use: Permanent crops / Olive grove (hectare)	2019/ TURKSTAT	879,177
Land use: Fodder crops (hectare)	2019/ TURKSTAT	2,097,381
Land use: Ornamental crops (hectare)	2020/ TURKSTAT	5,4
Greenhouse Production Areas by Qualifications (decare): Total	2019/ TURKSTAT	789604
Greenhouse vegetable and fruit production (tonne): Total	2019/ TURKSTAT	8,436,616
Organic crop production (including transition period): Production area (hectare)	2019/ TURKSTAT	545,870
Organic crop production (including transition period): Production (tons)	2019/ TURKSTAT	2,030,466
Cultivated agricultural area / Sown (hectare)	2020/ TURKSTAT	15,628,479

Indicators	Year/Source	Value
Cultivated agricultural area / Fallow (hectare)	2020/ TURKSTAT	3,387,382
Cultivated agricultural area / Vegetable (hectare)	2020/ TURKSTAT	789,906
Permanent crops / Area of fruits, beverage and spice crops (hectare)	2020/ TURKSTAT	3,518,760
Land use: Ornamental crops (hectare)	2020/ TURKSTAT	5,4
Seed Production (Total, ton)	2020/Ministry of Agriculture and Forestry	1,242,000
Certified Strawberry Seedling Production (Pcs)	2020/Ministry of Agriculture and Forestry	69,583,000
Certified Fruit Sapling (Pcs)	2020/Ministry of Agriculture and Forestry	119,853,000
Certified Vine Sapling (Pcs)	2018/Ministry of Agriculture and Forestry	2,666,000
Pesticide use, tonne	2019/ TURKSTAT	51,297
Total Plant Nutrient Consumption, tonne	2019/Ministry of Agriculture and Forestry	2,466,416
Agricultural tools and machinery: Plough	2019/ TURKSTAT	1384708
Agricultural tools and machinery: Sowing machine	2019/ TURKSTAT	479894
Agricultural tools and machinery: Fertilizer Distribution Machine	2019/ TURKSTAT	440312
Agricultural tools and machinery: Water pump	2019/ TURKSTAT	731862
Agricultural tools and machinery: Harvester	2019/ TURKSTAT	17190
Agricultural tools and machinery: Tractor	2019/ TURKSTAT	1354912
Agricultural tools and machinery: Milking machine installation	2019/ TURKSTAT	13178
Agricultural tools and machinery: Portable milking machine	2019/ TURKSTAT	342386
Live animals: Calf: male (head)	2020/ TURKSTAT	2299200
Live animals: Calf: female (head)	2020/ TURKSTAT	2279087
Live animals: Bullock: Ages 1-2 (head)	2020/ TURKSTAT	2123919
Live animals: Heifer: Ages 1-2 (head)	2020/ TURKSTAT	2497499
Live animals: Cow: Age 2 and above (head)	2020/ TURKSTAT	7801427
Live animals: Bull and Ox: Age 2 and above (head)	2020/ TURKSTAT	964350
Live animals: Water Buffalo (head)	2020/ TURKSTAT	192489
Live animals: Camel (head)	2020/ TURKSTAT	1293
Live animals: Swine (head)	2020/ TURKSTAT	990
Live animals: Sheep (head)	2020/ TURKSTAT	42,126,781
Live animals: Goat (head)	2020/ TURKSTAT	11,985,845
Live animals: Horse, mule and donkey (head)	2020/ TURKSTAT	223430
Live animals: Poultry (head)	2020/ TURKSTAT	386,080,582
Animal products: Cow milk (tonne)	2019/ TURKSTAT	20,782,374
Animal products: Water Buffalo milk (tonne)	2019/ TURKSTAT	79341
Animal products: Sheep milk (tonne)	2019/ TURKSTAT	1521455
Animal products: Goat milk (tonne)	2019/ TURKSTAT	577209
Animal products: Honey (tonne)	2020/ TURKSTAT	104077

Source: Ministry of Agriculture and Forestry ve TURKSTAT (Erişim Tarihi: 22.03.2020)

2.1.1. Land Structure

Türkiye has a generally mountainous land structure. In Türkiye, where the average altitude above sea level is 1,141 m, 57% of the land is over 1,000 m elevation and 62% of the land has over 15% of slope. The diversity of topography is the result of the accumulation of tectonic movements and volcanic materials in recent geological periods, elevating various areas. The following table demonstrates the distribution of the lands in the country by elevation.

Table 2. Distribution of Area by Elevation

Elevation (m)	Ratio to total area (%)
0-500	18
500-1.000	25
1.000-1.500	30
1.500-2.000	16
>2.000	11

Source: Ministry of Agriculture and Forestry[12]

12 "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 5

Anatolia is divided into valleys formed by 15 rivers, including the Tigris and Euphrates Rivers, which originate from Eastern Anatolia and flow south across Syria and Iraq to the Persian Gulf. Kızılırmak, which passes north of Ankara and flows into the Black Sea, is the largest river in the country. It originates from and empties into the sea on Turkish land.

Central Anatolia is a high plateau at an elevation of 800 to 1,000 m with several mountains. Towards the inner part of Central Anatolia, the plateau slopes gradually flatten to a basin containing a large salt lake - Lake Tuz. In the north of Anatolia, mountain ranges are higher and closer to the sea towards the east, allowing a narrow, green and fertile belt along the Black Sea coast.[13]

The Central Anatolian plateau, cleft by canyons and dominated by volcanic peaks, forms the heartland of Türkiye. Eruptions of the volcanic Mounts Erciyes (3,196 m) and Hasan (3,268 m) covered the plateau surrounding Nevşehir with tufa, a soft stone comprised of lava, ash and mud, three million years ago. Its soft structure allows the material to be hollowed out easily, which is exactly how thousands of shelters, homes and sacred places were built in the past.

At many points in the Black Sea Region, the mountain ranges rise above 3,000 while altitude gradually decreases towards the west of the North Anatolian Mountains. Several north-running rivers intersect the valleys at the plateau, towards the Black Sea. Çoruh River, which is one of the transboundary rivers of Türkiye, passes through this region up to Georgia. The tallest dam in Türkiye, Deriner Dam (249 m) was constructed on the Çoruh River in Artvin Province.[14]

Eastern Türkiye consists of rugged land with high elevations. With the region having a harsher climate and more precipitation than the Anatolian Plateau, the average height of the peaks is over 2,000 m. The highest point of Türkiye, Mount Ağrı (5,172 m) is located in this area. With an area of 163,000 km^2, Eastern Anatolia is the largest region of Türkiye, making up 21% of the total area of the country.

Southeast Anatolia is much lower and flatter than Eastern Anatolia, with its altitude falling from 800 m in the north to 400 m at the Syrian border. As the topography of the region is very suitable for constructing dams to meet national energy and irrigation requirements, many dams have been built in the region. The region is flat in the south and mountainous in the north. The basaltic Karaca Mountain (1919 m) is the highest point in the area.[15]

Although it is under the influence of prevailing winds and sea; there is a close connection between Türkiye's climate and landform characteristics due to the "rain shadow" effect caused by the northern and southern mountain ranges. Türkiye's land structure and the climatic characteristics that change accordingly enabled the formation of various geographical regions and microclimate areas. The land structure and climatic characteristics of the geographical regions in Türkiye have a harmonious relationship. And this allows forestry activities in humid regions, livestock breeding in high mountainous and arid regions, and plant production in any region. This characteristic provides the opportunity to produce region-specific agricultural products in different ecological regions in Türkiye.[16]

2.1.2. Climate Conditions

As is the case in animal production, the ability of plants to grow and survive depends on the climatic conditions in which they live and may vary among different species of the same plant. For example, a temperature of 17°C can be sufficient for early ripening grape species to reach an adequate level of maturity while other species may require a temperature of 19°C.[17]

Average annual temperatures vary widely throughout the country depending on elevation, topography, proximity to the sea, and continental conditions. Throughout the year, the highest temperatures are

13 Ministry of Agriculture and Forestry, "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 6.

14 Ministry of Agriculture and Forestry, "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 7.

15 Ministry of Agriculture and Forestry, Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems, Ankara, Food and Agriculture Organization of the United Nations, 2019,p. 6.

16 Prof.Dr. Fahri Yavuz, Türkiye'de Tarım, Ankara, Ministry of Agriculture and Rural Affairs, 2005, p.10.

17Prof.Dr. Miktad Kadıoğlu et al., Türkiye'de Ýklim Değiþikliği ve Tarımda Sürdürülebilirlik, Istanbul, Türkiye Food and Drink Industry Associations Federation, 2017, p.42.

recorded in the months of July and August. During these two months, the average temperature is 27°C on Mediterranean and Aegean coasts and between 22 to 24°C on the Black Sea and Marmara coasts. The average annual temperature varies between 18 to 20°C on the south shores (Mediterranean), falling to 14 to 15°C on the west coast (Aegean), and fluctuating between 4 to 18°C in the interior region depending on elevation.[18] The figure below demonstrates the climate regions in Türkiye.

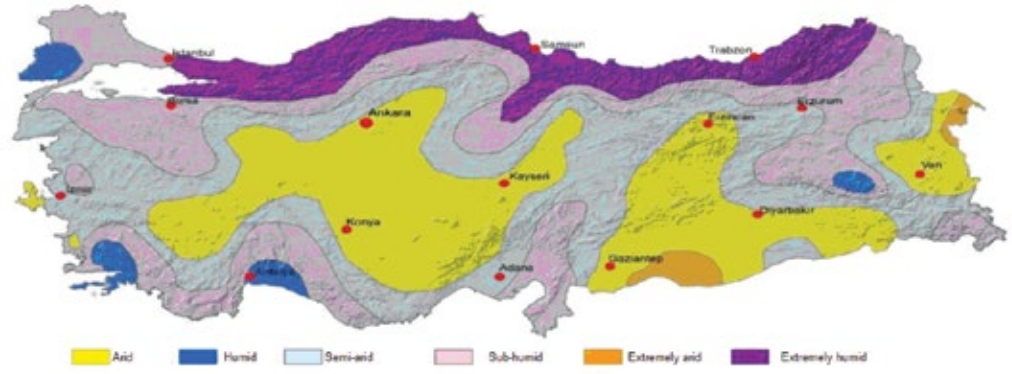


Figure 2. Climate Regions[19]

Türkiye is located between the subtropical and temperate zones. Additionally, the fact that it is surrounded on three sides by sea's , the position of the mountains, and the diversity of its landforms have led to 4 major climate types: Continental, Mediterranean, Black Sea and Marmara (transitional).

2.1.3. Soil Structure

Soil structure is one of the main factors affecting the vegetation to grow in a certain area. Soil is a heterogeneous system in which various properties are dynamically affected by one another. The physical properties of soil include various qualities such as depth, granulation, structure, texture, ait and moisture content, temperature, colour, soil reaction (pH) and organic matter content.[20]

Approximately 38[21]ha of Türkiye's total surface area is used as agricultural land, with alluvial soils constituting the most important soil group among cultivated lands. This type of soil, which makes the most fertile agricultural lands due to its rich nutrient content, is deep easily processable since it consists of sand, clay and gravel, and generally takes the form of delta plains at the points where rivers flow into the sea.

While different geographical regions carry a wide range of soil groups, the most common types of soil in Türkiye in terms of spread are brown forest soil and brown soils. These soil types, which are mostly observed in areas dominated by the continental climate, are generally used in the cultivation of grains.

In order to protect our country's agricultural lands and ensure the controlled management of potential non-agricultural lands, an automation system named TAD PORTAL[22] was established to manage the amendments to Law No. 5403 on Soil Conservation and Land Use and develop the software required for carrying out the processes of the Department of Land Assessment of the General Directorate of Agricultural Reform within the automation system. Furthermore, 429 Large Plains

18 Ministry of Agriculture and Forestry, "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 9..
19 Prepared by MoAF Geographical Information Systems Department of Central Research Institute of Field Crops, (Ankara, 2019)
20 Ministry of Agriculture and Forestry, "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 10.
21 TURKSTAT Tarım Alanı Verileri, https://data.tuik.gov.tr/Kategori/GetKategori?p=tarim-111&dil=
22 https://tad.tarim.gov.tr/TadPortal/

Protected Areas on a surface area of 9,23 million ha in 72 provinces were designated according to Article 14 of Law No. 5403. In the 2019-2023 Strategic Plan, the Ministry of Agriculture and Forestry assumed the role of ensuring the protection, efficient use and sustainable management of soil and water resources. Furthermore, the Action Plan resulting from the 3rd Agriculture Forest Council set the target of ensuring that Land Use Plans are drafted for the whole country. In this context, Land Use Planning efforts were initiated at a scale of 1/25,000 throughout the country. Finally, the "Integrated Land Use Planning (ILUP) for Food Security by Enhancing Climate Resilience and Ecosystem Management" project is carried out in the pilot Ayaş district of Ankara province within the frame of the Technical Cooperation Programme (TCP) of FAO.

Under the National Geographical Soil Fertility Information Management System, 50,000 soil samples are taken from agricultural areas to determine their nutrient content, fertility and toxic element status of soils in order to ensure the sustainable and efficient use of Türkiye's natural resources in accordance with their capabilities by updating the parameters for the fertility of Turkish soils and determining the coverage of toxic elements. Soil maps with a scale of 1:100,000 are prepared through project data and the data are uploaded to "National Soil Data Bank" which is updatable and searchable. The soil management information system and the data produced will also contribute to the prevention of soil degradation, adaptation to climate change, and the effective execution of regional action plans.

The Global Soil Partnership (GSP) system, aiming for the sustainable use of soil resources in the world to ensure food security, was established in cooperation with MoAF and FAO.

Another effort carried out in cooperation with MoAF and FAO is the Geographical Soil Organic Carbon Information System. Uınder the scope of this system, the Soil Fertility - Organic Carbon Geographic Information System Web Portal was created using the soil data generated on a national and basin basis, and the Soil Carbon Map for Türkiye was drafted and included in the World Carbon Map.

Extensive studies were carried out to calculate the quantity of organic carbon in the soil and to reveal the current situation of Türkiye under the Soil Organic Carbon Project signed between Ministry of Environment, Urbanization and Climate Change, General Directorate of Combating Desertification and Erosion (GDCDE) and TUBITAK-BILGEM in 2017. The study resulted in the identification of carbon biogeography areas, the development of a methodology for a carbon monitoring system, and a soil organic carbon map.

Furthermore, DEMIS (Dynamic Erosion Model Monitoring System) and UDREMIS (National Dynamic Wind Erosion Model Monitoring System) software were developed by Ministry of Environment, Urbanization and Climate Change GDCDE to monitor and evaluate the erosion of the soils in Türkiye and to serve as a basis in soil-focused national and international projects such as Food Security, Sustainable Land Management (SLM) and Balancing Land Degradation (BLD).

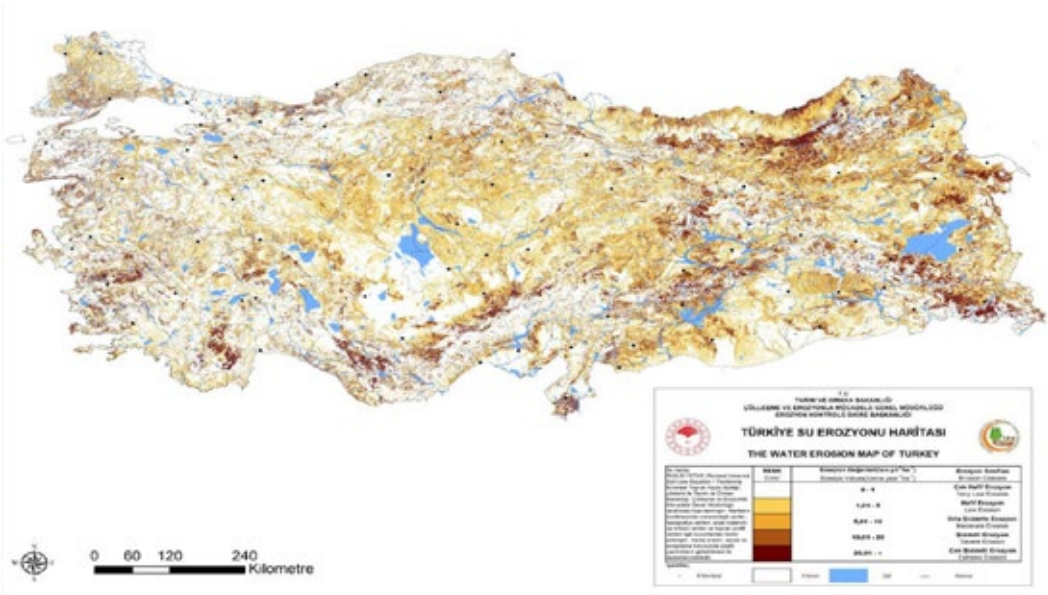


Figure 3. National Water Erosion Map [23]

Soil Database was created to form a basis for many studies, especially agricultural and forestry sectors by supporting soil data by MoAF, prevent recurrent soil studies and establish "National Soil Information System in Türkiye". A web-based portal that can provide thematic map outputs to submit soil map and survey cards stored in Soil Database in a standard way to users and conduct various examinations and analyses was developed. As a result of the study that started in 2013 and is ongoing, about 3,000 soil maps and data and profile information on about 59,000 soils are published on http://toprakportal.cem.gov.tr/.

2.1.4. Agricultural Basins

A total of 945 Agricultural Production Basins were identified by MoAF under the "Basin-based Support Model" in which over 1 billion data on climate, soil, topography and land use classification have been evaluated over the course of 3 years. In identifying the basins, data such as average, highest and lowest air temperatures, precipitation, etc. were used as climate data while the most suitable areas with similar ecological structures, that are suitable for the administrative structure of the country, that are of manageable sizes and suitable for growing agricultural products were considered in order to enable production planning.

In the model, which was implemented for the first time in 2017, 941 agricultural basins were identified by considering each district where agricultural activities were carried out as an agricultural basin. In 2018, the number of basins was updated to 945 due to the establishment of new districts.

The aim was to review production and development plans, ensure that the supply and demand balance in Türkiye is maintained at the desired level, the production deficit or surplus is not a burden on the economy, and the plans made by using the data produced on agriculture are not incomplete (Figure).

23 Erpul, G., Şahin, S., İnce, K., Küçümen, A., Akdağ, M.A., Demirtaş, İ., Çetin, E., 2018. Türkiye Su Erozyonu Atlası. Çölleşme ve Erozyonla Mücadele Genel Müdürlüğü Yayınları. Ankara

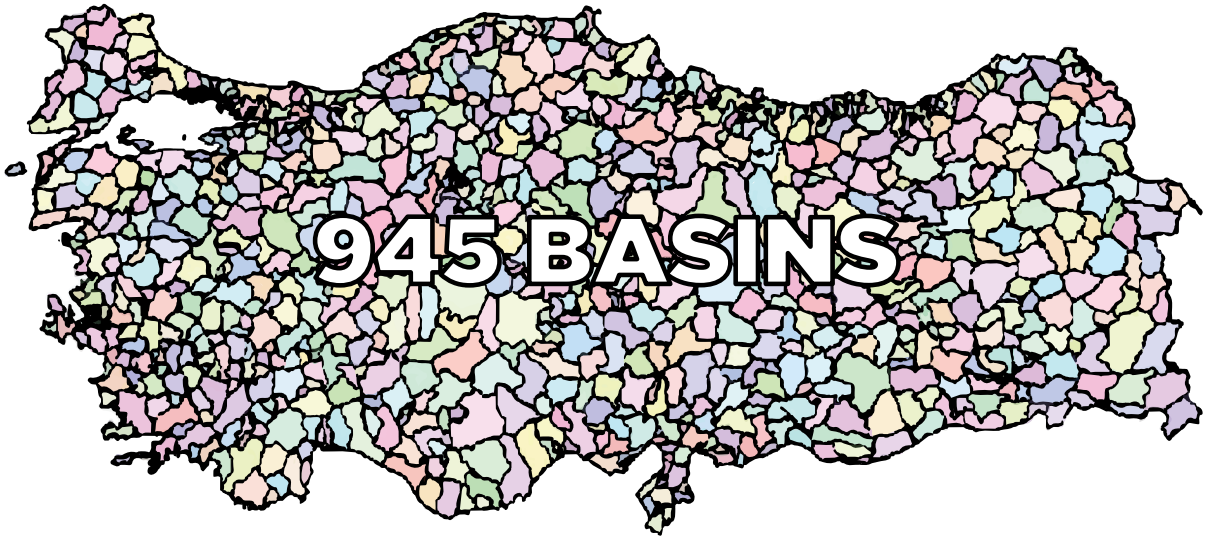


Figure 4. Agricultural Basins in Türkiye on the Basis of 945 Basins

The Basin-based Support Model will yield various benefits for Türkiye, including[24] ;

- Providing the agricultural products that are strategic and for which there is a supply deficit primarily from Türkiye's national resources,
- Enhancing farmers' competitiveness through increased efficiency and quality,
- Transitioning to planned production,
- Maintaining the crop rotation and water constraint practices, which were taken as a basis in the aids for the first time,
- Protecting biodiversity, soil and water resources,
- Ensuring supply and demand balance,
- Mitigating the burden on public financing that originate from purchases,
- Enhancing international competitiveness through production planning,
- Analyzing the impacts of potential advancements in Türkiye's EU harmonization process on significant agricultural products,
- Drafting a healthy agriculture inventory,
- Making forward-looking demand projections,
- Ensuring the rational, guiding and efficient use of aids,
- Protecting natural resources and ensuring their sustainable use,
- Meeting sectoral demands with regard to basin-based planning and management.

2.1.5. Biodiversity, Genetic Resources and Endemism [25]

Biodiversity is a concept that refers to the richness of living species in a particular habitat, their genetic characteristics, habitats, and the ecological relationships occurring in such habitats. There are four basic elements that represent biodiversity, which is a whole of the genes, species, ecosystems and ecological phenomena in a particular region;[26]

- Variety of species

24 Prof.Dr. Miktad Kadıoğlu vd., Türkiye'de İklim Değişikliği ve Tarımda Sürdürülebilirlik, (İstanbul, Türk Gıda ve İçecek Sanayii Dernekleri Federasyonu, 2017), 22.
25 Endemism: The presence of limited plant species in a narrow area.
26 Prof.Dr. Necmettin Çepel, Biyoçeşitlilik Önemi ve Korunması, (İstanbul, Türkiye Erozyonla Mücadele, Ağaçlandırma ve Doğal Varlıkları Koruma Vakfı Yayınları 15, 1997), 2.

- Genetic diversity
- Habitat diversity Functional diversity of ecosystems
- Türkiye is one of the richest countries in Europe and the Middle East in terms of biodiversity.

It contains the Mediterranean, the Euro-Siberian and the Iran-Turonian regions, which are three of the seven bio-geographical regions in the world, each with a distinct climate, flora and fauna, as well as their transition zones. The figure below demonstrates the bio-geographical regions in Türkiye. In addition to its global prominence in terms of biodiversity due to the fact that its climatic and geographical characteristics change at short intervals as a result of its position as a bridge between two continents; Türkiye is also the origin of the ancestors of many plant and animal species that are produced and cultivated in the world. Although Anatolia is not a separate continent, it single-handedly carries a wide range of ecosystems and habitat characteristics of an entire continent. Located at the intersection of three of the seven bio-geographical regions in the world, Türkiye is home to approximately 12,000 plant varieties, one-third of which is endemic.

Figure 5. Bio-Geographical Regions in Türkiye[27]

Each bio-geographical region has its own unique ecosystems. The Euro-Siberian element is composed of Black Sea Forests including Alpine meadows. The Central Anatolian and Eastern Anatolian steppes are Iran-Turonian elements. As it serves as a cross-continental bridge, Türkiye's climate and geographical features vary across short distances, as a result of which the country hosts an abundance of biodiversity with forests, mountains, prairies, wetlands, coastal and marine ecosystems as well as the different forms and combinations thereof.

Türkiye is among the leading countries in the world in terms of animal diversity, as well. In geographical terms, Anatolia is located at the intersection of Asia, Europe and Africa, as a result of which it contains living organisms that are unique to all three continents. Such factors as climatic changes, changing habitat characteristics, the instincts of animals to move and find new habitats combined with Anatolia's ecosystem that is convenient for the vital functions of animals to find food and shelter, results in the emergence of extremely rich animal diversity. Another reason for such a diversity of animals is that the high mountains, steppes, wetlands, forests, bushes and caves in Anatolia create extremely different ecosystems that allow a wide range of animal species to survive. The fact that Anatolia is on the migration route of birds provides richness in bird species, as well.

Türkiye is also considered extremely rich in terms of marine species. The Black Sea in the north with cold and low-saline water; the Mediterranean in the south with warm and highly saline water; and the Marmara Sea, where these two seas intersect to form an inland sea, create suitable ecosystems that enable various

27 Prepared by MoAF Geographical Information Systems Department of Central Research Institute of Field Crops, (Ankara, 2019)

marine species to co-exist. In addition, the increasing number of tropical marine organisms migrating from the Red Sea enhances the richness of the species.

Genetic features can be described as a "life code" for all characteristics of each living organism. Some species of sheep and goat are extremely resilient to hunger, thirst and temperature while others are vulnerable to such circumstances. In other words, there is a genetic difference between certain sheep or goat species in terms of such characteristics. Genetic diversity is an important element that ensures the continuity of biodiversity.[28]

With 572 endemic taxa, the richest family of endemic species in Türkiye is Asteraceae. This is followed by Legumes (Fabaceae) with 385 taxa and Lamiaceae with 326 taxa. Türkiye also hosts 14 endemic varieties. High endemic levels in Türkiye are concentrated in specific areas such as Amanos Mountains, Ilgaz Mountain, Central Toros, Taşeli Plateau, Bolkar and Kaz Mountains, Uludağ, the mountains between Gümüşhane and Erzincan, Munzur Mountains, and Salt Lake and its salty steppes. Some of the 3,649 endemic plant taxa in Türkiye are the relatives of the crops that feed the world. e.g., some field crops (wheat, barley, rye, oat, flax, lentils, chickpeas and peas), pasture crops (alfalfa, clover, sainfoin, vetch and grassy fodder crops) and horticultural crops (cherry, apricot, plum, almond, fig and grape) [29]. The figure below shows the areas with high plant endemism rates.

Figure 6. Areas with High Plant Endemism Rates [30]

Moreover, Türkiye has five micro-gene centres that serve as a source or a diversity centre for various medicinal and aromatic plants and economically important plants such as fruit tree species, carrying over a wide variety of 100 species. The micro-gene centres provide important genetic resources for the future sustainability of various plant species that are widely cultivated across the world (Table).

28 Prof.Dr. Necmettin Çepel, Biyoçeşitlilik Önemi ve Korunması, (İstanbul, Türkiye Erozyonla Mücadele, Ağaçlandırma ve Doğal Varlıkları Koruma Vakfı Yayınları 15, 1997), 3.
29 Ministry of Agriculture and Forestry, "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 18.
30 Prepared by MoAF Geographical Information Systems Department of Central Research Institute of Field Crops, (Ankara, 2019).

Table 3. Micro-Gene Centres for Plant Species in Türkiye

MICRO-GENE CENTRE	COMMON SPECIES
Thrace-Aegean	Triticum aestivum, Triticum durum, Triticum turgidum, Triticum compactum, Triticum polonicum, chickpea, melon, vetch, lupine, clover
Southeast Anatolia	Triticum dicoccoides, Aegilops speltoides, pumpkin, watermelon, cucumber, pea, lentil, broad bean, vine, legume fodder crops
Samsun, Tokat and Amasya	Various fruit tree species, pea, lentil, broad bean and other legume fodder crops
Kayseri and vicinity	Almond, apple, pea, vine, lentil, chickpea, clover and sainfoin
Ağrı and vicinity	Apple, apricot, cherry, watermelon and legume fodder crops

Türkiye has a considerably rich fauna diversity among the countries in the temperate climate zone. Invertebrates, most of which are insects, are the most numerous group with 60,000-80,000 species. The sub-class of winged insects (Pterygota) has 22,125 identified species in Türkiye. The total number of vertebrate species that have been identified to date is around 1,500. This figure includes 694 freshwater and marine fish species, 460 bird species, 30 amphibian species, 161 mammal species and 120 reptilian species [31].

2.1.6. Conservation and Use of Genetic Resources

Located on three different climate zones and three different bio-geographical areas, Türkiye hosts an extremely wide diversity of ecosystems and natural habitats with around 12,000 plant species, around 19,000 invertebrate species, over 1,500 vertebrate species, 2 major bird migration routes, 1,444,293 ha of marine protected area, 1865 km protected coastline; and 2,783 protected areas, 44 national parks and 243 nature parks covering a total area of 5.9 million ha.

Biodiversity is adversely affected by a range of human-induced activities. These include notably overfishing, habitat degradation, spreading and invasion of alien species, domino effects, pollution, and climate change which inevitably change the global fauna and flora for the worse. In other words, factors such as the degradation of habitats inhabited by living species, the introduction of alien species, overconsumption, pollution of the physical environment (soil-water-air), climatic changes at the global level, and industrial agriculture destroy the biodiversity surrounding the Earth. Today, the increasingly rapid change and adverse impacts are followed with great concern, and efforts are being made to produce solutions to minimize the impacts of the change.

Ex-situ protection efforts are carried out by MoAF, Directorate General of Agricultural Research and Policy (DGARP) with a view to ensuring the protection, long-term conservation, and sustainability of Türkiye's plant genetic resources as well as their use in scientific research and transfer to future generations. In this context, as of the end of 2020, there are 55,627 seed samples of approximately 3,339 species in the National Seed Gene Bank included in Aegean Agricultural Research Institute and 61,451 seed samples of 1127 species in the Türkiye Seed Gene Bank included in Central Research Institute of Field Crops. 117,078 seeds in total are retained.

Fruit and vine gene sources, which cannot be stored in seed form, are kept at field gene banks. 18 Field Gene Banks within the MoAF, DGARP Research Institutes carry approximately 9,500 live samples from 107 species, with 6 Research Institutes keeping bulbous and tuber ornamental plants (geophytes). Türkiye's gene banks carry out efforts towards the collection, storage, registration, molecular and morphological characterization, production renewal of genetic material, and native species in particular, as well as making them available to research institutes.

The seeds that are kept at our gene banks can be stored for many years, preserving their genetic structure at the time of their collection/acquisition. Gene banks enable the preservation of the genes that are needed today or in the future without being exposed to erosion through natural or artificial factors. The collections carried in Seed Gene Banks include native varieties, wild and transitional forms, other endemically significant (medical, aromatic,

31 Ministry of Agriculture and Forestry, "Türkiye's Biodiversity: Impact of Genetic Resources on Sustainable Agriculture and Food Systems", (Ankara, United Nations Food and Agriculture Organization, 2019), 16.

ornamental, etc.) species and endemic species of plants. Digital Herbarium data on the species that are stored is available at http://herbaryum.tagem.gov.tr/.

Genetic material consisting of 88,484 embryos, semen, cells and DNA belonging to 7 bovine, 18 ovine and 5 horse breeds, which is our national heritage, is preserved in our Animal Gene Banks for future generations, mainly by freezing, with articifial methods.

With the project "Genetic Resources Database and Business Processes Management System" to facilitate the access to genetic resources, the studies are implemented under the activities related to the unification of the information on Plant, Pet, Aquatic, Microorganism and Invertebrate Genetic Resources studied by DGARP Institutes on a database.

In order to identify genetic resources at a molecular level, BARKODTÜRK, which is a domestic and national digital database, was introduced; a tissue and DNA bank was established for our endemic plants, starting the efforts to register them to Türkiye.

The studies carried out by research institutes affiliated with DGARP Field Crops Research Department of the MoAF with regard to the "Promotion of Sustainable Food System" are as follows:

- IMI-tolerant varieties are developed in field crops.
- Improvement efforts for the health of grains and legumes are carried out for varieties with high mineral content and availability.
- The International Winter Wheat Improvement Programme (IWWIP) was initiated between Türkiye-ICARDA (International Centre for Agricultural Research in the Dry Areas) and CIMMYT (International Maize and Wheat Improvement Centre); 88 varieties (49 of which were developed specifically for Türkiye) were developed under the ongoing IWWIP programme that aims to provide the CWANA (Central, West Asia and North Africa) region and other demandant countries with improvement material. The Programme, which makes use of the agro-ecological differences and characteristics of the countries of Türkiye and associated countries, includes 12 Institutes affiliated with the Department of Field Crops to support the programme.
- The most comprehensive and broadest database on rangeland was created through the National Rangeland Use and Management Project. The database created will also form a basis for plans such as national livestock, rural development, agricultural production basins, protection of natural resources and environmental protection.

In terms of Pest Control; the fundamental aim is to implement an integrated pest control programme that keeps the population density of harmful organisms below the level of economic loss threshold by using all appropriate pest control methods and techniques coherently with a view to ensuring access to safe and quality food and the sustainability of agricultural and natural resources in our country as well as in the world. This is a pest control system that contributes to sustainable agricultural production that maintains the natural balance among human health, the environment, the biodiversity found in nature and all living creatures as well as taking the natural equilibrium into account. It yields various benefits such as reducing the risk of outbreak by protecting good organisms that play a critical role in restraining harmful organism populations and preventing unnecessary pesticide applications, which, in turn, will reduce overall pesticide application and reduce the risks of poisoning in human beings and animals and lower the costs of pest control.

The integrated pest control programme prioritizes alternative methods to chemical control, such as cultural measures, biological control, biotechnical methods and the use of resilient varieties in combating diseases and weeds.

As a result of the research under Integrated Pest Control conducted at research institutes affiliated with the Department of Plant Health Research, the "Technical Instructions for Agricultural Pest Control" and "Technical Instructions for Integrated Pest Control", which determine the principles regarding diseases and weeds that are problematic for the cultivated plants in Türkiye, are being prepared and transferred to executive authorities. So far, 653 Technical Instructions for Agricultural Pest Control were prepared and made available to the public and private sectors. Additionally, 19 Technical Instructions for Integrated Pest Control for 23 products (Greenhouse, Citrus, Lentil, Chickpea, Olive, Vine, Cherry, Sour Cherry, Hazelnut, Cotton, Antep Pistachio, Potato, Apple, Pear, Quince, Peach, Maize, Apricot, Wheat, Rice, Pomegranate, Walnut, Outdoor Tomato) were prepared for farmers, who comprise the target audience, and

are implemented in cooperation with researchers, propagators and farmers.

A "Plant Protection Products Side Effects Research Centre" was established under Adana Biological Pest Control Research Institute to contribute to sustainable agricultural production; ensure food safety; reduce the use of pesticide; minimize the negative effects of pesticides in terms of human and environmental health; protect biological diversity; obtain products without pesticide residue; research/develop alternative biological control methods to chemical control; conduct research on the biology and efficiency of natural enemies of significant products; research mass production techniques for effective natural enemies; produce host plants and pests for natural enemies, and produce natural enemies to be used in side effect experiments.

Furthermore, efforts are underway to establish the "Biotechnical Control Research Center" under the Bornova Plant Protection Research Centre (ZMAE) to carry out projects for the research, design and development of biotechnical control methods against significant pests that cause economic damage to cultivated plants; developing standard methodologies for a quicker determination of the biological effectiveness of traps and pheromone emitters, which are applied upon a license request for indicated purposes; and contribute to the production of traps and pheromones in our country.

Ensuring food security and safety, boosting efficiency and quality for the increasing world population and conducting R&D efforts in plant improvement, variety development, seed science and technology, and increasing the production and use of certified seeds is indisputably essential. Additionally, projects on improvement, cultivation techniques and technology development are continued. Especially, works that focus particularly on field crop species are being carried out by addressing high efficiency, quality, biotic and abiotic stress factors.

The number of areas with a special protection status to preserve the species and areas that comprise our biodiversity is as follows[32], with the current number of protected areas in 2019 and 2020 shown in the table:

- 44 national parks,
- 243 nature parks,
- 30 natural reserves,
- 112 natural monuments,
- 84 wildlife improvement areas,
- 14 Ramsar Areas,
- 59 wetlands of national importance
- 13 wetlands of local importance

Table 4. Current Numbers of Protected Areas by Year

	National Park	Nature Park	Natural Reserve	Natural Monument
By the end of 2019	44	241	29	114
By the end of 2020	45	250	31	115

Biodiversity Inventory of Türkiye was completed with living groups with land works undertaken by over 900 academicians and subject-matter experts in 81 provinces. Biodiversity inventory data were transferred to Noah's Ark Biodiversity Database [33] created under MoAF, General Directorate for Nature Conservation and National Parks (GDNCNP) and biodiversity map of our country was created. The database allows for many examinations and reports which are specific to "species" and "special areas" on biological richness of our country and helps users to have access to their specific rights and data. The number of data reached 1,900,000.

On the other hand, the "Project to Register Traditional Knowledge Based on Biodiversity", which was initiated in 2017 and continued throughout 2019-2020, is among the firsts in the world in terms of its subject. For the first time in Türkiye, traditional knowledge based on biodiversity are compiled and registered. The project carried out under DKMP will contribute to making biodiversity useful in economic terms and using industrial property rights based on genetic resources for the benefit of the country. So far, the public's traditional knowledge on health, nutrition, industry, agriculture and livestock and other subjects was registered in 21 provinces under the project. The

32 Ministry of Agriculture and Forestry, General Directorate for Nature Conservation and National Parks Website.
33 Detailed information can be obtained from http://www.nuhungemisi.gov.tr/.

project will be completed in all 81 provinces by 2023. So far, the public's traditional knowledge on health, nutrition, industry, agriculture and livestock and other subjects was registered in 21 provinces under the project. The project will be completed in all 81 provinces by 2023.

Türkiye is a party to numerous international agreements, treaties and conventions on biological diversity. In 1996, Türkiye signed the United Nations Convention on Biological Diversity (UNCBD), which came into force in 1993 after its ratification in the Earth Sustainable Development Summit held in Rio de Janeiro in 1992 as a result of the destruction of biological diversity sources through human activities and the extinction rates for certain species reaching concerning levels.

2.1.7. Steppe Lands of Türkiye

The EU Project "Agricultural Practices for Ecosystem-Based Adaptation (EBA) to Climate Change in Steppe Ecosystems" was implemented and completed with GDAR and UN Food and Agricultural Organization Sub-Regional Office for Central Asia between the years 2016-2018. Under this project, Anatolian Steppes were defined and its map was prepared in digital environment. The steppe lands of 32,248,569 ha across 50 provinces included forest lands, agricultural lands, wetlands, settlement areas, pasture lands and protected areas. Additionally, Steppe ecosystems were also identified in this study (Figure 7).

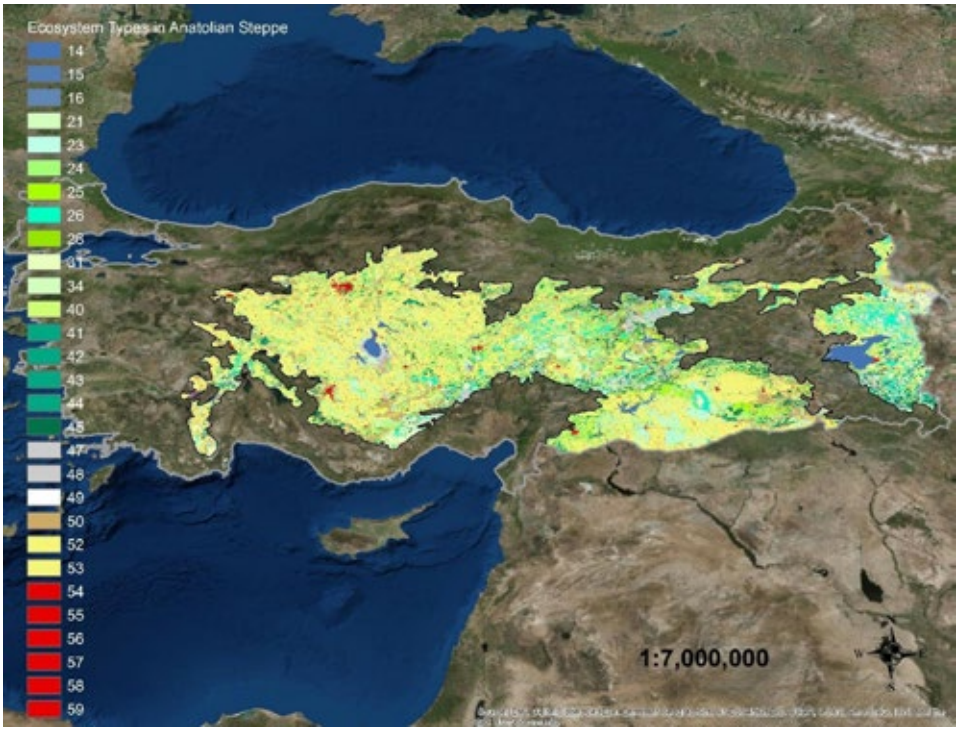


Figure 7. Ecosystem Types in Anatolian Steppe

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,CNES Airbus DS, USDA, USGS, AeroGRD, IGN and the GIS User Community

The precipitation-climate-elevation maps, steppe ecosystem vulnerability maps and steppe ecosystem type maps produced as part of the project were made into an online base by creating an IDEBIS system under the TARBIL system of the Ministry of Agriculture and Forestry. The base can be actively used with layers such as forest, rangeland, wetlands, cadastral and agricultural areas, satellite and orthophotos, administrative limits etc.

2.2. Water Resources and Agricultural Irrigation

2.2.1. Water Resources and Irrigation

Water is vital for human life and the ecosystem as well as a fundamental requisite for countries to develop. Water scarcity is becoming an ever-increasing and prevalent problem, with water quality rapidly deteriorating in almost every country. This problem leads to various economic and social problems. Unconscious and unplanned use of water and ground activities, in particular, directly affect soil quality as well as groundwater quality and quantity.

The pollution that is likely to occur as a result of such activities is quite difficult to cope with; removing the pollution from soil and groundwater and reintroducing it to the economy, in some cases, can be extremely costly or rather impossible. In the sustainable management of water and soil resources, planning should be carried out by taking the conservation and usage equilibrium into consideration, thus ensuring further efficiency and productivity for such resources.

The primary principles for agricultural irrigation management are preventing the losses that occur during the transmission and distribution of water, and ensuring the efficient use of water and mitigating risks by reducing the water demand in irrigational lands.

The total surface area of Türkiye is approximately 78 million ha, with studies showing that 8.5 million ha of this area is economically irrigable. By the end of 2020, 6.7 million ha of this area was made available for irrigation. MoAF aims to make the remaining 1.8 million ha of unirrigated land operational by 2023.

Out of 112 billion cubic meters usable water potential of our country only 60 billion is used, from which 77% belongs to agricultural irrigation However, the projections for 2023 anticipate the share of irrigation in the cross-sectoral sharing of water to fall to 64%.

As of 2020, the irrigable agricultural lands consist of 33% surface irrigation, 38% canalette irrigation and 29% closed irrigation systems. Almost all irrigation networks that are built today comprise closed pipeline systems. According to the inventory of irrigation facilities created by MoAF, as of 2019, 2743 irrigation facilities, corresponding to 65% of the total irrigation facilities, are operational.

In addition to land aggregation efforts, completing important irrigation infrastructure works such as connecting land parcels with irrigation channels and service roads, scaling parcel surface areas up to ensure economic production, and carrying out In-Field Development Services, together with transitioning to closed irrigation systems, will ensure high levels of water-saving.

The preparation of Basin Protection Action Plans, which is a top-priority effort carried out with a view to ensuring the basin-based management of water resources, which is among the most important components in the sustainable development of Türkiye, and meeting the requirements of the Water Framework Directive (WFD), was completed in 2013 for 25 river basins in the country. The plans served as a starting point for River Basin Management Plans that assessed biological, hydro morphological and chemical factors, considered target-setting and economic analysis, and established pressures, impacts and monitoring data. With the River Basin Management Plans, studies are carried out in order to achieve good water status in all water bodies by ensuring the protection and sustainable management of water resources. The plans also identify the financial cost recovery rates for each sector, particularly the irrigation sector. As of 2020, River Basin Management Plan studies have been completed in 8 basins in total (Gediz, Meriç-Ergene, Büyük Menderes, Konya, Susurluk, Küçük Menderes, Northern Aegean and Burdur Basins). The aforementioned River Basin Management Plans were approved by the Water Management Coordination Board (WMCB) and entered into force. In addition, with the “Technical Assistance Project for Economic Analysis and Water Efficiency Studies within the scope of the River Basin Management Plan in 3 Pilot Basins”, which started in 2017 and completed in 2021, river basin management plans were prepared for the Akarçay, Batı Akdeniz (Western mediterreanen) and Yeşilırmak Basins, and it will be submitted for approval at the first Water Management Coordination Board Meeting to be held. With the Sakarya River Basin Management Plan Preparation Project and the “Project of Preparating

River Basin Management Plans in 6 Basins" supported within the scope of the European Union IPA fund; studies for the preparation of river basin management plans for the Marmara, Antalya, Eastern Mediterranean, Western Black Sea, Eastern Black Sea and Kızılırmak basins are continuing.

Sectoral Water Allocation Plans were prepared for Seyhan, Akarcay, Konya, Little Menderes, Gediz and Burdur Basins with a view to ensuring the sustainable management of water at the basin level, including in arid periods, the planned use of the water requirements of all sectors for future activities, balanced distribution of water among sectors, and maximizing the benefits to be achieved from water use. As of 2021, work has started for the North Aegean, Büyük Menderes, Western Mediterranean, Marmara, Antalya, Eastern Mediterranean, Western Black Sea, Eastern Black Sea, Kızılırmak, Aras and Çoruh Basins. It is aimed to complete Sectoral Water Allocation Plans for all basins. As part of sustainable agricultural irrigation management, optimal plant pattern proposals are developed in Sectoral Water Allocation Plans to maximize economic value in irrigation areas. The proposals are formulated separately for each condition and for all types of irrigation areas including public irrigation, by taking into account both normal and drought conditions for designated years. Irrigation water demand is a principal parameter in plant pattern studies. Additionally, the actions required to ensure sustainability in the Agricultural Irrigation Sector and the responsible/relevant institutions/organizations for such tasks were also determined.

On the other hand, Drought Management Plans were formulated with an aim to enhance our country's resilience to drought, reduce economic losses, and raise the awareness of the public and local governments of drought, with a focus on mitigating the negative effects in the face of potential drought and determining the measures to be taken before, during and after drought to solve drought-related problems. The basin-based management plan which was formulated by using drought analyses, hydrological modelling and sectoral vulnerability analyses, also determines basin-specific measures through the "vulnerability analyses" for the agricultural sector.

The Flood Management Plans formulated at a basin scale with a view to determining and evaluating flood risks; mitigating the adverse impacts of floods on human health, the environment, cultural heritages and economic activities and thus supporting sustainable development determine the range of water in basins and submerged agricultural areas through hydraulic modelling used to calculate the economic losses in the agricultural lands within the basin. The management plans determine the necessary actions before, during and after flood and establish structural or non-structural measures for flood risk management.

2.2.2. Agricultural Irrigation Policies and R&D Activities

The 11th National Development Plan, which was published in the Official Gazette and covers the years 2019-2023, stipulates that the expenses required for public investments related to irrigation and the incentives and aids provided to promote investment, R&D, innovation, production and exports by the private sector shall be budgeted during the period of the Plan in order to meet the targets foreseen for priority sectors and development areas.

The Policies and Measures for the "Agricultural Sector", which is among the Priority Development Areas, set out in the Development Plan are as follows;

- Increasing the irrigation rate from 64% to 68% as a significant target,
- Maintaining investments according to priority in order to expand irrigation areas; continuing the efforts towards the protection of water in terms of quality and quantity and the efficient use of water,
- Make use of additional 2 million ha for irrigation
- Expanding modern irrigation systems such as drip and sprinkler irrigation methods that provide water-saving for the efficient use of water,
- Continuing land aggregation efforts in integration with irrigation investments

Renovation is extremely important with regard to the policies on irrigation facilities. In this framework, renovation projects were implemented to contribute to the irrigation facilities that were built and made operational by the General Directorate of State Hydraulic Works (GDSHW) of MoAF and

then transferred to the beneficiaries responsible for operational sustainability and management. However, the facilities were damaged over time due to various reasons. The renovation project, therefore, aims to make these facilities fully functional again, improving the farmers' use of such facilities in terms of duration and condition, ensuring water-saving and the sustainability of the operational and maintenance activities as well as the sustainability of water-saving.

The following is important in saving water through the renovation projects:

- Conservation, control, improvement and pollution prevention of water resources,
- Ensuring sustainable use of water,
- Increasing agricultural employment by boosting agricultural development,
- Increasing agricultural production and incomes,
- Reducing rural-to-urban migration through agricultural employment and increased agricultural income

Climate change adaptation planning and practices in water management are of major importance and priority to mitigate the adverse impacts of climate change. The most appropriate adaptation actions for our country include rainwater harvesting, the use of grey water, and the pricing of water services. In this context, the Project for Evaluating Alternatives for the reuse of Wastewaters in Türkiye was completed in 2019. The project determined that 3.1 billion m^3 water, which comprises 44% of the treated water potential of 7.1 billion m^3/year, can be reused, and 65% thereof can be reused in agricultural irrigation. According to another study entitled the Reuse of Water Returning from Agricultural Irrigation, Türkiye has a 3.3 million m^3/year drainage water potential that has returned from the irrigation of 2.4 million ha of land at 331 irrigation facilities that are 1000 ha and above. 2.2 billion m^3/year (66%) of this quantity is reusable, 64% of which potentially in agricultural irrigation.

On the other hand, legal regulations are introduced to ensure water-saving in irrigation systems and reduce pollution caused by irrigation. The "Regulation on Controlling Water Use and Reducing Water Loss in Irrigation Systems", which is among the most important regulations introduced in this framework, entered into force upon its publication in the Official Gazette of 16 February 2017 issue 29981. The purpose of the regulation is to standardize the principles and procedures with regard to reducing the costs for the procurement, distribution and usage of water through the efficient use of irrigation water in irrigation systems, saving water, reducing losses, and preventing unpermitted use. The Regulation also aims to increase the efficiency of irrigation to 55 % by year 2024. On the other hand, the "Regulation on the Protection of Water Against Nitrate Pollution Caused by Agricultural Practices", brought into force upon its publication in the Official Gazette of 23.07.2016 issue 29779, covers the technical and administrative principles regarding the determination of the nitrates and nitrate compounds that cause agricultural pollution in ground and surface waters, and preventing pollution.

The "Regulation on Controlling Water Use and Reducing Water Loss in Irrigation Systems", entered into force upon its publication in the Official Gazette of 16 February 2017 issue 29981. The purpose of the regulation is to standardize the principles and procedures with regard to reducing the costs for the procurement, distribution and usage of water through the efficient use of irrigation water in irrigation systems, saving water, reducing losses, and preventing unauthorized use.

Within the scope of the legislation; in existing irrigation facilities, renovation projects and investments in new irrigation facilities, it is necessary;

- To take measures to ensure the sustainable use of irrigation facilities,
- The cooperation and coordination of the responsible institutions, water user associations and relevant institutions in line with the objectives and targets determined in relation to irrigation activities,
- To ensure that irrigation facilities are managed by water user associations, real and legal persons established by users with a participatory irrigation management model,
- To use appropriate modern irrigation methods that save water,
- To carry out the necessary planning, monitor and evaluation activities for the sustainable use of irrigation facilities and correct irrigation practices

by using Geographical Information Systems,

- To prevent water users from using more water than the amount predicted in irrigation and water distribution plan according to actual needs,
- To take measures to keep irrigation efficiency at a high level,
- To give priority to surface water resources in irrigation,
- To give priority to attractive and low-pumped projects in new projects to be proposed for investment programs,
- To take measures to reduce water losses in irrigation systems and prevent illegal use.

In accordance with the regulation, responsible institutions are required to take measures to increase irrigation efficiency rates to 55% by 2024.

It is of great importance to accelerate R&D and innovation activities in the field of water in order to produce sustainable solutions that will reduce the pressures of growing population, industrial demands and global climate change on fresh water resources, which are the most fundamental needs of the society.

One of the key elements and triggering forces of sustainability is support models. In order to produce data for the support policies, the national project entitled "Determination of the Technical and Economic Performance of Drip Irrigation Systems Used in Türkiye" was carried out by DGARP.

The outputs of the project, which was formulated with a view to determining the performance of drip irrigation in different regions of Türkiye and for various product groups, established the performance of drip irrigation systems, which have become more prevalent owing to the non-recourse loans provided by the Turkish Government to encourage efficient water use.

Considering the global impacts of climate change in recent years, research institutes working on agricultural irrigation have been making significant contributions to the potential increase in agriculture in terms of the sustainable use and management of soil and water resources by conducting research on water-saving irrigation methods, water harvesting, increasing the efficiency of water use, establishing appropriate technology and irrigation programmes for the optimum use of irrigation water under limited water conditions, use of low-quality irrigation water, and use of natural resources and alternative technologies as agricultural inputs. The R&D activities carried out by DGARP have been extended in collaboration with the private sector and universities.

In order to reflect the outcomes of R&D to national policies, and particularly in the context of expanding the use of pressurized irrigation systems that save water, support practices are carried out since 2006 to transform and expand existing surface irrigation methods into pressurized irrigation methods within the framework of the Rural Development Investments Support Programme. R&D data on soil and water resources were the primary basis for the initiation of such practices.

"Water Consumption Guide of Irrigated Plants in Türkiye" and "Irrigation Techniques Guide of Irrigated Plants in Türkiye" prepared by DGARP are used by public entities, universities and private sector to reveal the water efficiency of basins and water budget of the basin, identify agricultural support at sub-basins level by considering existing water potential and water consumption of plants, as well as climate, soil and topography and identify water needs of plants that will be used at planning, design and operation stages of irrigation projects. In this context, the relevant guide was used in basin-based studies in 2019. The guide was **transferred to the digital environment called DGARP-SUET** in line with the demand and recommendations of the sector to reach a broader user profile.

Extending the limited use of water and ensuring the expansion of irrigation areas have become imperative. **Irrigation should be performed during the periods in which crops require the most water; irrigation should be limited in other periods, ensuring the irrigation of broader areas with the water saved from the limited practice.** While yield loss is inevitable in areas with limited irrigation, the overall increase in production and revenue will be much higher through the use of the water that has been saved in dry areas.

In this framework, the national project entitled **"Developing Crop Irrigation Programmes According to Irrigation Methods that Save Water Under Limited Water Conditions"** is carried out by

DGARP. Based on the results of such efforts, the **"Sub-surface Drip Irrigation Support Programme"** was included in the Communiqué on Promoting Individual Irrigation Systems under the 2016-2020 Rural Development Aids published by the Ministry.

Alternative irrigation methods are developed for water-intensive products, in addition to the efforts to develop drought-resilient products to boost production in dry conditions and minimize the damages caused by drought. The most significant restrictive factor in rice farming is the provision and management of irrigation water.

In this scope, the R&D projects carried out by DGARP aim to eliminate excessive use of water in rice farming by using drip irrigation systems.

Monitoring and Evaluation studies in irrigation facilities are essential for generating the primary data that enable the analyses to help develop various policies and strategies on various strategic topics such as agricultural production planning, ensuring food supply security, and the sustainable use of soil and water resources.

Similarly, the monitoring and evaluation of irrigation projects in technical, social, economic and environmental aspects, particularly in the operation stage, are of crucial importance for the success of such projects.

One of the most significant impacts of climate change is the changes that occur in available water resources. Reducing the irrigation needs of crops through rainwater harvesting and preservation of rainwater within the soil is an efficient method to compensate for the decrease that will occur in water resources. The "Agricultural Implications for Ecosystem-Based Adaptation (EBA) to Climate Change in Steppe Ecosystems" project was used to develop the "Ecosystem-Based Adaptation Strategy for Anatolian Steppe Ecosystems" which is a policy paper that will be used in agricultural water use, soil and biodiversity conservation, making use of ecosystem services, and expanding a production model in which agriculture is aligned with the ecosystems.

2.3. Forest and Forestry Products

2.3.1. Forestry Assets of Türkiye

Forests are natural resources that offer various economic, ecological and socio-cultural benefits to humankind such as food, fuel, shelter, clean air and water, medicine, income source, employment, recreation, landscape, etc. Forest as an ecosystem is a living system and community in which trees, other plants and animals, and other invisible organisms in the soil interact with one another in a certain balance with the environment. The lasting of the material and non-material benefits and services of such an invaluable natural resource depends on its management based on the principle of sustainability. Almost all of the forests in Türkiye are fully owned by the State.

With a total area of 78 million ha, Türkiye is richly diverse in terms of ecology. Amongst all the richness, forests play a significant role as a species and a composition. While the afforested lands in Türkiye were 20.8 ha in 2002, this rate increased to 22.6 million ha in 2019 and it is planned to further increase up to 23.4 million ha by 2023.

33% of the forests are broad-leaved (oak, beech, alder, chestnut, hornbeam, etc.), 48% are coniferous (red pine, larch, scotch, fir, spruce, cedar, etc.), 19% are a hybrid of coniferous and broad-leaved forests. In terms of spreading area, oak is the most widespread tree (5.9 million ha), followed by pine, larch, beech, scotch, juniper, fir, cedar, spruce, stone pine, alder, chestnut, hornbeam, poplar, linden, ash and eucalyptus trees.

2.3.2. Production and Marketing of Forest Products

The annual wood raw requirement of the woodworking industry, which is a significant sector for Türkiye, is currently 31 million m^3. In 2018, wood production was increased up to 22.75 million m^3 in order to reduce the foreign dependency by the sector. Our target for 2023 is to reach 32 million m^3.

The industrial plantation, which was 5,000 ha in 2018, was increased to 60,000 ha in 2019 in order to meet wood raw material needs.

Figure 8. Türkiye's Production Projection for the Year 2023

2.3.3. Non-Wood Forest Products

According to TURKSTAT data, the area of forestlands, which stood at 20,199,000 ha in 1988, were increased to 22,740,000 ha in 2019 and 2020. Türkiye is an extremely rich country in terms of flora and fauna. Nearly 3,600 of the 12,000 plant species which grow in Türkiye are endemic. Additionally, 80% of medicinal plants grow in forests.

It is of utmost importance that Türkiye is able to obtain the highest share it deserves from the market by applying this capacity to produce the highest amount of added value. Among all export products of Türkiye, our "Non-Wood Forest Products" follow an ever-increasing trend in terms of both production quantity and added value. Türkiye is the world leader in daphne exports (90%) and provides more than half of global demands for thyme. Other important export products include sage, rosemary, mushrooms and flower bulbs. Exports of fruit products such as pine nut, carbon and chestnut are also on the rise. As of the end of 2020, the number of honey forests in Türkiye has reached 596. A total of 104,077 tons of honey was produced in 2020. By 2023, it is aimed to increase the number of honey forests to 730 and the quantity of honey produced to 125,000 tons. Türkiye ranks 2nd in honey production and 1st in pine honey production

2.3.4. 5,000 Forests for 5,000 Villages Project under Afforestation Activities

As part of the 5,000 Forests for 5,000 Villages Project Action Plan (2015-2019), formulated with the aim of diversifying income sources for the rural population and contributing to the national economy; afforestation efforts were carried out to plant walnut, almond, mulberry, grafted olive, stone pine, chestnut trees, etc. The data on Türkiye's forest assets are shown in the following table, by province.

Table 5. Forest Assets

PROVINCE	TOTAL FORESTLAND						
	Fertile		Degraded		TOTAL Ha	Ratio to Overall Province Area %	Overall Province Area ha
	Ha	%	Ha	%			
Adana	384,434	65	209,226	35	593,660	42	1,417,417
Adıyaman	37,580	24	121,001	76	158,581	22	731,084
Afyonkarahisar	109,874	39	168,962	61	278,836	20	1,406,710
Ağrı	0	0	5,905	100	5,905	1	1,087,975
Amasya	101,346	46	119,335	54	220,681	39	560,474
Ankara	248,746	55	203,312	45	452,058	18	2,577,976
Antalya	664,810	58	481,252	42	1,146,062	56	2,061,764
Artvin	221,532	55	182,163	45	403,695	57	710,973
Aydın	203,555	62	123,050	38	326,605	40	822,661
Balıkesir	427,902	68	204,136	32	632,038	43	1,460,268
Bilecik	143,824	60	96,428	40	240,252	57	419,565
Bingöl	46,701	18	218,233	82	264,934	33	805,637
Bitlis	71,542	40	108,695	60	180,237	18	1,018,997
Bolu	409,893	77	121,909	23	531,802	65	819,169
Burdur	196,712	59	134,999	41	331,711	47	698,630
Bursa	359,474	74	126,162	26	485,636	45	1,079,544
Çanakkale	361,953	75	118,512	25	480,465	48	1,000,510
Çankırı	113,016	59	79,104	41	192,120	25	769,942
Çorum	215,047	49	226,347	51	441,394	35	1,253,797
Denizli	343,503	58	245,169	42	588,672	48	1,217,993
Diyarbakır	44,949	14	280,410	86	325,359	21	1,516,918
Edirne	72,390	70	30,624	30	103,014	17	617,386
Elazığ	42,762	25	127,130	75	169,892	19	913,111
Erzincan	49,657	23	162,566	77	212,223	18	1,179,862
Erzurum	91,191	35	165,691	65	256,882	10	2,470,413
Eskişehir	236,868	58	173,189	42	410,057	29	1,419,998
Gaziantep	52,999	47	59,618	53	112,617	16	688,660
Giresun	174,486	68	83,654	32	258,140	36	711,632
Gümüşhane	139,800	58	99,777	42	239,577	40	591,592
Hakkari	21,788	12	158,059	88	179,847	24	753,662

PROVINCE	TOTAL FORESTLAND						
	Fertile		Degraded		TOTAL Ha	Ratio to Overall Province Area %	Overall Province Area ha
	Ha	%	Ha	%			
Hatay	145,699	70	62,368	30	208,067	38	546,954
Isparta	177,816	46	208,232	54	386,048	44	873,283
İçel	468,129	56	367,405	44	835,534	53	1,563,068
İstanbul	225,413	94	15,275	6	240,688	44	541,609
İzmir	251,241	53	224,538	47	475,779	40	1,182,170
Kars	28,096	82	6,345	18	34,441	4	808,808
Kastamonu	693,322	79	180,329	21	873,651	66	1,320,561
Kayseri	25,396	19	107,186	81	132,582	8	1,742,082
Kırklareli	223,328	88	31,135	12	254,463	40	641,501
Kırşehir	32,889	75	10,779	25	43,668	7	669,005
Kocaeli	122,909	86	20,318	14	143,227	42	337,426
Konya	219,554	45	273,303	55	492,857	12	3,957,121
Kütahya	412,079	64	234,473	36	646,552	55	1,165,137
Malatya	48,480	26	140,860	74	189,340	15	1,263,081
Manisa	292,130	54	250,350	46	542,480	41	1,332,567
Kahramanmaraş	205,620	39	315,793	61	521,413	36	1,433,300
Mardin	1,648	1	153,156	99	154,804	18	874,277
Muğla	545,567	66	283,742	34	829,309	68	1,227,859
Muş	29,651	38	48,775	62	78,426	9	884,686
Nevşehir	3,593	32	7,602	68	11,195	2	517,365
Niğde	21,165	38	35,073	62	56,238	8	717,237
Ordu	170,308	84	32,588	16	202,896	35	587,114
Rize	105,737	59	73,212	41	178,949	47	383,729
Sakarya	188,426	90	19,800	10	208,226	43	488,650
Samsun	317,653	82	71,168	18	388,821	40	975,104
Siirt	47,109	20	185,155	80	232,264	38	610,208
Sinop	296,698	81	70,398	19	367,096	64	572,565
Sivas	116,330	30	270,951	70	387,281	14	2,819,148
Tekirdağ	92,439	91	8,735	9	101,174	16	628,510
Tokat	290,405	61	187,974	39	478,379	48	999,067
Trabzon	140,988	78	40,854	22	181,842	35	521,299
Tunceli	119,043	48	126,493	52	245,536	32	775,188

PROVINCE	TOTAL FORESTLAND						
	Fertile		Degraded		TOTAL Ha	Ratio to Overall Province Area %	Overall Province Area ha
	Ha	%	Ha	%			
Şanlıurfa	9,523	64	5,327	36	14,850	1	1,919,798
Uşak	109,591	49	113,905	51	223,496	40	553,937
Van	1,907	4	43,234	96	45,141	2	1,898,097
Yozgat	154,537	57	118,235	43	272,772	20	1,370,370
Zonguldak	173,710	90	20,364	10	194,074	56	346,160
Aksaray	14,450	62	9,019	38	23,469	3	780,843
Bayburt	17,722	59	12,071	41	29,793	8	363,809
Karaman	57,722	24	185,629	76	243,351	24	999,953
Kırıkkale	38,353	55	31,933	45	70,286	16	447,147
Batman	22,795	26	66,101	74	88,896	21	425,240
Şırnak	72,023	27	194,924	73	266,947	40	672,427
Bartın	119,895	89	15,542	11	135,437	59	228,576
Ardahan	22,983	75	7,774	25	30,757	6	547,671
Iğdır	0	0	161	100	161	0	534,005
Yalova	40,407	85	7,163	15	47,570	60	79,192
Karabük	232,991	84	45,839	16	278,830	72	389,553
Kilis	14,646	54	12,386	46	27,032	21	131,457
Osmaniye	112,264	71	46,415	29	158,679	48	331,318
Düzce	120,434	97	3,782	3	124,216	52	241,092
Toplam	12,983,148	57	9,638,787	43	22,621,935	29,0	78,004,644

Source: GDF

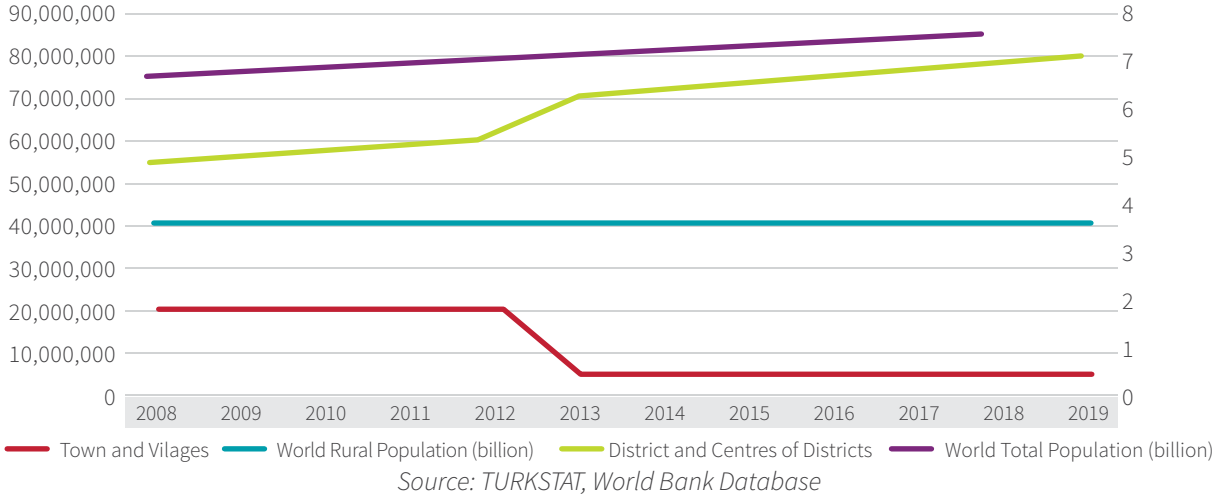
3 SOCIO-ECONOMIC STRUCTURE AND KEY INDICATORS

3.1. Demographic Structure

The population of Türkiye exceeded 83.5 million in 2020. While 75% of the population live in urban areas in industrial countries, the rate of urban population was 75.1% in Türkiye in 2018[34]. The share of the rural population in the overall population is shown in the table below. While the overall population, as well as the urban population, have shown a regular increase in the last decade, the rural population went through a continuous decline except for in 2018. In 2013, the rural population decreased by 61% while the urban population increased by nearly 20%. The population growth rate (%) varies by year. There is a striking increase of 15.88% in 2010. The population living in towns and villages had a significant decrease throughout the years. The most important reasons for which include the changing definition of rural areas. This results with the reducing the share of the agricultural employment that is concentrated in agriculture in overall employment.

Table 6. Population of Towns and Villages and Provinces and District Centres, by Year

Years	Total Population	Towns and Villages	Ratio of Towns and Villages to Total Population (%)	Provinces and District Centres	Ratio of Provinces and District Centres to Total Population (%)	Total Population - Male	Total Population - Female	Population Growth Rate (%)
2008	71,517,100	17,905,377	25.0	53,611,723	75.0	3, 462,470	36,098,842	13.1
2009	72,561,312	17,754,093	24.5	54,807,219	75.5	37,043,182	36,679,806	14.5
2010	73,722,988	17,500,632	23.7	56,222,356	76.3	37,532, 954	37,191,315	15.88
2011	74,724,269	17,338,563	23.2	57,385,706	76.8	37,956,168	37,671,216	13.5
2012	75,627,384	17,178,953	22.7	58,448,431	77.3	38,473,360	38,194,504	12
2013	76,667,864	6,633,451	8.7	70,034,413	91.3	38,984,302	38,711,602	13.7
2014	77,695,904	6,409,722	8.2	71,286,182	91.8	39,511,191	39,229,862	13.3
2015	78,741,053	6,217,919	7.9	72,523,134	92.1	40,043,650	39,771,221	13.4
2016	79,814,871	6,143,123	7.7	73,671,748	92.3	40,535,135	40,275,390	13.5
2017	80,810,525	6,049,393	7.5	74,761,132	92.5	41,139,980	40,863,902	12.4
2018	82,003,882	6,337,385	7.7	75,666,497	92.3	41,721,136	41,433,861	14.7
2019	83,154,997	6,003,717	7.2	77,151,280	92.8	41,915,985	41,698,377	13.9
2020	83,614,362	5,878,321	7.0	77,736,041	93.0	36,462,470	36,098,842	5.5



Source: TURKSTAT, World Bank Database

As of 2020, the median age in Türkiye is 32.7 with an upward trend over the years.

34 https://cevreselgostergeler.csb.gov.tr/kentsel---kirsal-nufus-orani-i-85670

Table 7. Median Age in Türkiye by Year and Gender

Year	Total	Male	Female
2008	28.5	27.9	29.0
2009	28.8	28.2	29.3
2010	29.2	28.7	29.8
2011	29.7	29.1	30.3
2012	30.1	29.5	30.6
2013	30.4	29.8	31.0
2014	30.7	30.1	31.3
2015	31.0	30.4	31.6
2016	31.4	30.8	32.0
2017	31.7	31.1	32.4
2018	32.0	31.4	32.7
2019	32.4	31.7	33.1
2020	32.7	32.1	33.4

Source: TURKSTAT

On the other hand, the number of registered Syrians under temporary protection in Türkiye is a total of 3,656,525 as of 24 February 2021. While 1,733,34 (47.4%) of this comprises children aged 0-18 years, the total number of children aged 0-18 years and women amounts to 2,589,969 (70.8%). Syrian men comprise 53.8% and Syrian women 46.2% of the total Syrian population. The ratio of young Syrian population to total Syrian population is 20.4%. Türkiye has been implementing various programmes for Syrians, including in the fields of agriculture, healthcare, employment and social integration. Türkiye has been hosting around 320,000 individuals of other nationalities in addition to 3.6 million Syrians.

3.2. Agricultural Services

It is critical to deliver agricultural services to those who are engaged in agricultural activities without any interruption. It is also extremely important to enhance economic, social and environmental well-being for those engaged in agriculture, including the rural population, through various means and in a sustainable manner. Agricultural services include various services and means from the sustainable use of natural resources, e.g. soil and water resources to identifying measures to improve living conditions in rural areas in order to enhance the quality and quantity of agricultural production, boosting productivity, and increasing the contributions of the agricultural sector to the national economy. The most notable means are addressed below.

3.3. Organization in Agriculture

Various forms of agricultural organizations exist in Türkiye, such as cooperatives, producer and irrigation unions, farmer's associations and agricultural professional organizations based on different legislations.

Cooperatives are autonomous organizations that are comprised of individuals with common economic, social and cultural needs and wishes who come together voluntarily through a democratically controlled agency. According to another definition, cooperatives refer to partnerships that are established to meet, in financial terms, and provide the professional and livelihood needs of natural and legal persons who lack sufficient economic power, rationally through mutual assistance, solidarity and guarantee. Cooperatives are based on an original model that enhances social development and provides a basis for business enterprises. These business enterprises incorporate the following characteristics:

- Ownership by partners, service to and management by the partners
- Self-sufficiency, self-responsibility, democracy, equality, justice and solidarity
- Principles-based business

In our country, cooperatives operate under three different Ministries. Agricultural cooperatives are under the Ministry of Agriculture and Forestry, building cooperatives under the Ministry of Environment and Urbanization; and other cooperatives, such as those for tradespeople, transporters, pharmacists, women's initiatives, businesses, etc. are under the Ministry of Trade. Cooperatives carry on their activities within the framework of directly or indirectly relevant laws,

i.e., Law No. 1163 on Cooperatives, Law No. 1581 on Agricultural Credit, Law No. 6964 on Chambers of Agriculture, Turkish Commercial Code No. 6102, and Law No. 5488 on Agriculture.

Producer organizations for agricultural purposes in Türkiye involve various forms of set-ups under unit cooperatives, regional cooperative unions and central cooperative unions. In the context of agricultural producer unions; positioned at the top are central unions, below which are regional unions and agricultural credit cooperatives, respectively. Table 8 demonstrates the agricultural producer organizations in Türkiye in detail.

Table 8. Agricultural Producer Organization in Türkiye (2020)

APPLICABLE LAW	UNIT COOPERATIVES			REGIONAL COOPERATIVE UNIONS				CENTRAL COOPERATIVE UNIONS (**)			
	Species	Number	No. Of Members	Category/ Type	Number	No. Of Common Cooperatives	No. Of Members	Number	No. Of Common Unions	No. Of Common Cooperatives	No. Of Members
Law No.1163	Agricultural Development	6.807	737.358	Village-Coop.	14	1,423	166,444	1	13	1,277	146,332
				Agriculture	13	543	62,250	1	15	952	109,005
				Livestock	35	1,734	179,301	1	36	1,806	194,000
				Forestry	18	951	113,146	1	28	1,731	211,376
				Tea	5	35	65,752	1	5	35	65,752
Law No.1163	Irrigation	2,475	319,174	Irrigation	13	673	93,228	1	13	617	88,930
Law No.1163	Aquaculture	567	30,611	Aquaculture	17	232	14,304	1	14	199	11,403
Law No.1163	Beetroot Producers	31	1,397,191	Beetroot Producers	1	31	1,397,191	0	0	0	0
	Subtotal	**9,880**	**2,484,334**		**116**	**5,622**	**2,091,616**	**7**	**124**	**6,617**	**826,798**
Law No.1581	Agricultural Credit	1,618	800,023	Agricultural Credit	17	1,618	800,023	1	17	1,618	800,023
	Subtotal	**11,498**	**3,284,357**		**133**	**7,240**	**2,891,639**	**8**	**141**	**8,235**	**1,626,821**
Law No.4572	Agricultural Sales (*)	338	332,925	Agricultural Sales	13	281	308,346	0	0	0	0
Law No.1163	Tobacco Production And Marketing (*)	18	939	Tobacco Production And Marketing	1	9	124	0	0	0	0
Law No.1163	Fresh Fruit And Vegetable Marketing (*)	29	2,953	Fresh Fruit And Vegetable Marketing	0	0	0	0	0	0	0
	Grand Total	**11,836**	**3,617,282**	**Total**	**147**	**7,530**	**3,200,109**	**8**	**141**	**8,235**	**1,626,821**

Source DGAR (2020)

In this framework, unit cooperatives have 3.6 million, regional cooperative unions 3.2 million, and central cooperative unions 1.6 million members. The following table presents producer unions based on product/product groups, no. of unions, and no. of member farmers.

Table 9. Producer Unions (2020)

APPLICABLE LAW	PRODUCER UNIONS		
	PRODUCT/PRODUCT GROUP	NO. OF UNIONS	NO. OF MEMBER FARMERS
LAW NO.5200	ANIMAL PRODUCTION	571	320,787
LAW NO.5200	PLANT PRODUCTION	235	21,247
LAW NO.5200	AQUACULTURE	31	1,214
LAW NO.5200	ORGANIC PRODUCTS	30	2,438
	TOTAL	**867**	**345,686**
APPLICABLE LAW	**BREEDER UNIONS FOR IMPROVEMENT PURPOSES**		
	SPECIES	**NO. OF UNIONS**	**NO, OF MEMBERS**
LAW NO.5996	BREEDING CATTLE	81	240,314
LAW NO.5996	BREEDING SHEEP - GOAT	80	249,409
LAW NO.5996	BEE	80	72,325
LAW NO.5996	BREEDING WATER BUFFALO	30	8,898
LAW NO.5996	CHICKEN	6	759
	TOTAL	**277**	**571,705**

Source: DGAR (2020)

The number of farmer members of producer unions is 345,686 while that of breeder unions for improvement purposes is 571,705. According to the "Türkiye's Top 500 Industrial Enterprises" research results, cooperatives are among the top 500 industrials in Türkiye.

Agricultural cooperatives and their higher unions are inspected by Controllers who serve under DGAR. Chambers of agriculture are inspected by their own central union, which is inspected by MoAF. There are various good practice examples involving women in Türkiye, e.g., the Çolakpehlivan Agricultural Development Cooperative established by women in 2010, that operates in Devrek/Zonguldak and produces and markets vegetables, fruits, honey, jam and local products to regional marketplaces and hotels and the Kulaca Village Agricultural Development Cooperative established in 1990, that produces and exports tomato and red pepper paste.

The Charter of the Women's Cooperative for Enterprise, Production and Operation was drafted in 2012, under the Turkish Cooperatives Strategy and Action Plan (2012-2016) published by the Ministry of Trade, pursuant to Article 88 of Law No. 1163 on Cooperatives within the frame of working towards production by and employment of women under the umbrella of cooperatives. This gave rise to the establishment of a new legal status of 'women's cooperative' in Türkiye, which, although is not any different from other cooperatives in terms of obligations, is a special category that targets social and economic objectives hand-in-hand and is considered within the framework of traditional gender roles of women. These cooperatives are membership-based structures that are founded by women and strive to produce solutions to the social and economic problems experienced by women; they operate in various fields such as handicrafts, home-based production, and social services that are associated with the traditional roles attributed to women.[35] Food production, which is also among such activities, is a common area of activity in women's cooperatives; women's cooperatives that operate in the field of

35 http://www.keig.org/wp-content/uploads/2018/11/kooperatif_kilavuz_keigWeb.pdf

agricultural food production include "Afşar Balam Women's Cooperative for Enterprise, Production and Operation" that produces local foodstuffs (noodle, tarhana, sauce, bulgur, vinegar, jams, dried fruits and vegetables, etc.) with the principle of minimum carbon footprint and zero waste, and uses waste as vermicompost in agriculture; and the Cooperative of the Anatolian Women at Polatlı district of Ankara that produces such foodstuffs as beetroot molasses and orange-carrot jam and that has reached the stage of cooperating with chain restaurants. As a significant part of sustainable food systems, cooperatives are among the prominent models of organization in the world. Cooperativism, which is a system that ensures food security for all, aims to guarantee food security for future generations and that is supported by economic, social and environmental factors, is an efficient and productive non-profit model of organization. As an alternative solution to today's primary concerns such as rapid population growth, urbanization, changing consumption habits, climate change and in particular, employment; cooperatives enhance social development and serve as a foundation for businesses. As indicated in the 2019 Report of the International Labour Organization, agriculture provides large-scale employment opportunities for people living in the rural parts of underdeveloped and developing countries. Recent years, in particular, have seen the establishment of cooperatives that will provide a solution to youth unemployment and re-encourage agriculture to ensure that it is perceived as a sector in addition to supporting local development. It will be beneficial to make efforts to increase the number of cooperatives that engage in awareness-raising activities related to local education, healthcare, women and youth and that do not prioritize profit.

3.3.1. Turkish Agricultural Credit Cooperatives

The establishment of the Turkish Agricultural Credit Cooperatives is based on the "Country Funds" established by Mithat Pasha in 1863. Following the establishment of the Republic of Türkiye, Agricultural Credit Cooperatives, becoming common in the countrywide, continues their activities in accordance with the principles of cooperativism in order to meet the short- and medium-term cash and in-kind credit needs of partners, evaluate their products, meet their production material and equipment demands, train members, and serve as an insurance agency. Agricultural Credit Cooperatives and their umbrella organizations have reached their present state through the laws and decrees introduced on various dates. By meeting the financial needs of their members, they make significant contributions to the continuity and improvement of production.

Agricultural Credit Cooperatives, along with Ziraat Bank of the Republic of Türkiye, is one of the two organizations that largely finance the agricultural sector. In their current state, Agricultural Credit Cooperatives also operate in the absence of banks in small settlements such as villages and towns, serving the Turkish agricultural sector by providing farmers with adequate loans for their agricultural cash credit needs and in-kind input needs to be used in production, at the lowest cost possible.

While ensuring the provision of input for agricultural producers pursuant to their establishment purpose, Agricultural Credit Cooperatives also aim to meet the financial funding need resulting from insufficient agricultural capital accumulation. Therefore, it has always provided economic and continuous input supply by producing agriculturally significant inputs through partnerships and subsidiaries.

In order to meet the capital needs of its producers under appropriate conditions, Agricultural Credit Cooperatives and Ziraat Bank offer Treasury-supported low-cost credit advantages. In the cases where producers use credit from Agricultural Credit Cooperatives, loans can be postponed in order to ease the distress of the producer in periods of drought and natural disasters.

Within the scope of contracted production and product evaluation activities, Agricultural Credit Cooperatives buy the agricultural products produced by the farmers through their cooperatives at the value price and supplies them to the market through Agricultural Credit Cooperative Markets, the national and local markets with which it cooperates. The Central Union of Agricultural Credit Cooperatives opens Cooperative Markets throughout Türkiye to bring natural and high quality products directly from producers and cooperatives to consumers at affordable prices.

3.4. Agricultural Insurances

The first regulation regarding "Agricultural Insurances" in Türkiye was incorporated in the Ziraat Bank legislation of 1937, with a view to ensuring safe and consistent production by farmers.

The agricultural sector faces a wide range of risks from natural disasters to price instability, pests, diseases and accidents, in the event of which not only farmers but also all actors involved in the food production chain will be affected negatively. Unfavourable situations that arise in the entire agricultural sector cause breakdowns in the chain, interrupting agricultural sustainability. While there are various measures ranging from farms at the micro to government policies at the macro level that can be taken to ensure sustainability in agriculture; in recent years, agricultural insurance, in particular, has come to the fore as an important risk management tool[36] .

Upon its publication in the Official Gazette of 21.6.2005, Law No. 5363 on Agricultural Insurance was brought into force in Türkiye in order to regulate uncertain public budget burdens that may result from risks, by ensuring the sustainability of agricultural production and food security[37].

While "Agricultural Risk Management" gained a new dimension as well as momentum through the Law, the Agricultural Insurance Pool (TARSIM) was established to compensate the losses suffered by producers due to the risks that are covered, provide premium support and implement agricultural insurance practices[38] .

As an insurance system established, supported and supervised by the State, TARSIM carries out its operations for the public, without seeking profit, and completely in the favour of producers within the framework of insurance principles and techniques. Created in cooperation with the public, civil society and the private sector, the system operates with the purpose of compensating the losses of producers by covering the risks that they may suffer[39] .

3.5. Agricultural Extension Service

Ataturk, the founding father and Esteemed Leader of the Republic, ordered the establishment of a state farm in Ankara in 1925 to acquaint villagers with modern agricultural innovations and lead them in their implementation. The story of the establishment of the farm, the name of which was decided by law to be "Ataturk Forest Farm" (AFF) in 1950, is studied in various faculties of agriculture as an example of agricultural innovation in itself. The nonarable lands on which the AFF was built have now become a full-fledged farm as a result of various improvement works.

Farmers and university students from various disciplines, and particularly Faculties of Agriculture and Veterinary Medicine, receive practical training at the AFF. In addition to agricultural production, the AFF, which is home to various animal and plant species, also comprises dairy and juice factories and leather and iron working shops. Furthermore, agricultural sector works were also carried out at the AFF.

Historical Development[40]

- 1846-First agricultural school was established in Yesilkoy
- 1893-Halkalı Agricultural School was established
- 1928-Ankara Higher Agricultural School, which became a faculty of agriculture in 1948, was established
- 1931-In the First Agricultural Congress, the decision to have farmer children in school and to give agricultural education to village teachers and soldiers
- 1938- The First Congress on Villages and Agriculture was held and the concept of agricultural extension was brought to the agenda for the first time
- 1943-Organization of agricultural extension (primarily in Ankara, Eskişehir and Manisa provinces)

36 https://web.tarsim.gov.tr/havuz/, accessed: 02.09.2019.
37 https://web.tarsim.gov.tr/havuz/, accessed: 02.09.2019.
38 https://web.tarsim.gov.tr/havuz/, accessed: 02.09.2019.
39 https://web.tarsim.gov.tr/havuz/, accessed: 02.09.2019.
40 Source: Şenocak, 1967, Özçatalbaş ve Gürgen, 1998; Atsan ve Şoraklı, 2006, Yurttaş ve Atsan, 2011, TOB 2019. Exact citation from the Agricultural Training, Farmers' Training-Extension, R&D and Innovation Group Working Paper of the 3rd Agriculture and Forestry Council. https://cdniys.tarimorman.gov.tr/api/File/GetFile/330/Sayfa/1416/1778/DosyaGaleri/10._tarimsal_ogretim_ciftci_egitimi_yayim_arge_ve_inovasyon.pdf

- 1948-Faculties of Agriculture and Veterinary Medicine were established at Ankara University
- 1984-Agricultural Extension and Practical Extension Project-I (TYUAP)
- 1990 Agricultural Extension and Practical Extension Project -II (TYUAP)
- 2004 2nd Council of Agriculture
- 2004 Project to Support Village-Based Agricultural Production (KÖYMER- One Thousand Agronomists to One Thousand Villages)
- 2006 Law No. 5488 on Agriculture
- 2006 Regulation on the Elaboration of Agricultural Extension and Consulting Services
- 2007 Agricultural Extension Development Project (TARGEL)
- 2011 Department of Training, Extension and Publications was established (renamed as Department of Training and Publishing in 2018)
- 2019 Third Agricultural Forest Council
- 2021 1st Water Council

Currently, agricultural extension is under the responsibility of MoAF. MoAF develops training strategies for producers and consumers with a view to ensuring accessible and sustainable agricultural product supply; establishing a highly competitive agricultural sector in the national and international arenas; enhancing the knowledge and skills of farmers, thus increasing production; and improving product quality and standards. By implementing R&D outcomes, it aims to meet the knowledge needs of farmers in a timely manner as well as obtaining further efficiency from per unit area. On the other hand, farmers' training and extension activities comprise the entirety of agricultural extension activities that aim to provide farmers with the skills to help them solve the problems they may encounter. Pursuant to Presidential Decree No. 1, the Department of Training and Publication of the Ministry of Agriculture and Forestry is the unit responsible for carrying out farmers' training, agricultural extension and consultancy services. Its other duties include:

- Publication and dissemination of visual, auditory and written documents on subjects under the area of responsibility of the Ministry
- Collection, evaluation and publication of all kinds of knowledge and documentation relating to the area of responsibility of the Ministry for training purposes; preparation of films, slides, images and similar documents; carrying out archiving, documentation and library services with regard to such matters
- Carrying out, or having others carry out, all kinds of training activity that is under the area of responsibility of the Ministry
- Cooperation with relevant public and private agencies on the publications on the subjects that fall under the area of responsibility of the Ministry and carrying out other tasks assigned by the Minister.

The Department of Training and Publishing is parent to the Agricultural Communication Centre as well as the International Agricultural Training Centre; Directorates of Agricultural Extension and In-service Training of the Agricultural Production Enterprise in Adana and Söke district of Aydın; and Bilecik, Düzce, Elazığ, Kastamonu, Silifke Atatürk and Sivas Handicraft Training Centres. Furthermore, the Agricultural TV channel ('Tarım TV') and the Academy of Agriculture and Forestry, which are the online broadcast channels of the Ministry, provide services through hundreds of training videos and online training sessions. The Digital Agricultural Library of the Ministry offers services to its users through the e-Government application. Moreover, a cooperation protocol was executed between the Ministry and the Council of Higher Education (CoHE) on 15 January 2020. It resulted with taking the cooperation established with universities on infrastructure, personnel, training and R&D much further.

Agricultural extension and consulting activities are carried out under the Regulation on the Elaboration of Agricultural Extension and Consulting Services. The agricultural consulting system aims to establish an extended, efficient and productive agricultural extension and consulting system throughout the country in order to ensure meeting the needs of farmers/agricultural business owners with regard to knowledge, technique and methodology adequately

and in a timely manner. Agricultural consultants or consulting service providers, which are authorized by the MoAF, have been offering agricultural extension and consulting support since 2009 with a view to ensuring the pluralism, efficiency and productivity of agricultural extension and consulting system within the frame of the Communiqué on Support Payments for Agricultural Extension and Consulting Services.

Training and extension services are also provided by universities; the Central Union of Agricultural Credit Cooperatives and its relevant organizations whose tasks include carrying out occupational training activities; the Chamber of Agricultural Engineers, Chambers of Agriculture, Union of Agricultural Engineers, Chambers and Union of Veterinary Surgeons, Chamber of Food Engineers and other relevant chambers of profession, all of which are responsible for following and disseminating the developments and innovations in their respective professional areas, building relationships and engaging in joint efforts with domestic and foreign professional chambers to that end, representing their respective occupations in the national and international arena, making suggestions and providing assistance with regard to the training of the members of their profession by cooperating with Agricultural Engineer training establishments, and developing and implementing in-service training programmes for their respective members. Additionally, private agricultural consultants, private firms, businesses that engage in extension activities through TV and social media, international organizations (World Bank, United Nations, FAO), voluntary organizations, relevant NGOs and producer unions can also engage in agricultural extension and training activities in Türkiye through various means.

3.6. Gender Equality, Women's Empowerment and Disadvantaged Groups

The rights to participate in the labour force and employment are an integral part of human rights for women. In this regard, gaining economic independence is a positive factor in women's well-being, empowerment, health and social status. Furthermore, lack of necessary measures in the working life as well as failing to meet the necessary requirements regarding sectoral, workplace and working conditions will potentially have unfavourable consequences for women. Informal employment of women, particularly in agriculture and home-based domestic work, cause them to be excluded from the protective mechanisms provided by social security systems. Disguised unemployment or unpaid family work in the agricultural sector particularly affects women, youth and children. Additionally, working life can potentially result in unfavourable consequences for the structural shift trends in the agricultural sector; rural-to-urban migration has either left women jobless by changing the labour status of women who previously worked in agriculture as unpaid family workers for the worse, or forced them to work in low-paid jobs without social security. The main causes of the need for transformation include the nonproportional burden of domestic obligations laid on the shoulders of women, the lack of qualifications required by the labour market, and the need to combat artificial obstacles such as discrimination.

Various efforts have been carried out in cooperation with public agencies, the private sector, NGOs and other relevant parties on the national scale to ensure women's full participation in working life and enhance their position in the labour market.

ILO and other international organizations cooperate to implement active labour market policies and occupational training programmes. The first "Action Plan on Women's Employment (2016-2018) ", drafted as a result of the joint efforts carried out by the Ministry of Family and Social Services and ILO that led to the "Empowerment Project of Women for Decent Work in Türkiye", is among the most significant works towards enhancing the conditions in the labour market. The Action Plan provided a framework under which projects related to the vocational training and employment of women are supported. In addition to such projects that specifically targeted disadvantaged groups of women such as informal female workers in agriculture and home-based work, disabled women, divorced and widowed women; special courses, programmes, projects and protocols were also implemented to maintain and encourage women's employment as well as enhancing their vocational qualifications. In this frame, 2,021 vocational training courses were held, attended by a total of 31,524 women.

- On 30 October 2018, a protocol was executed between the Ministry of Family and Social Services, the Ministry of Trade and the Ministry of Agriculture and Forestry with a view to strengthening women's cooperatives, ensuring their sustainability, boosting their institutional capacity, enhancing their visibility, increasing their number and ensuring women's active participation in economic and social life.

Under the coordination of the MoFSS, the "Strategy Paper and Action Plan on Women's Empowerment (2018-2023) "was drafted in cooperation with public institutions, local governments, universities, NGOs, chambers of profession, the private sector and other relevant parties in order to empower women in all aspects of social and economic life. The document addressed the baseline, primary objectives, other objectives, strategies and activities regarding five policy pillars, i.e., education, health, economy, participation in decision-making mechanisms, and the medi.

In this context, the most important strategies for women's economic empowerment, in particular, include:

- Re-evaluating the labour market legislation and making necessary improvements for effective implementation within the framework of the goal of further empowerment of women (Strategy No. 1),
- Strengthening the economic position of women and developing economic and social policies to combat informality, especially unpaid family labour (Strategy No. 3) and
- Increasing efforts to engage women who require special policies in economic life (Strategy No. 6).

It is planned to implement such strategies through maintaining and increasing the efforts to empower and increase women's cooperatives, develop vocational and skill training programmes for female seasonal travelling agricultural workers, and promote female entrepreneurship by making use of technological facilities and advancements, in particular, in agro-based sectors.

Therefore, Türkiye has been attaching greater importance to developing cooperation and good governance among key actors at all levels in order to improve gender equality and guide women towards ensuring food and nutrition safety as well as meeting the relevant SDGs.

Türkiye also promotes and recognizes all efforts of the Committee on World Food Security (CFS) on gender equality and women's improvement with a view to making the food and nutrition sector available for those who work in disadvantaged rural areas and in the agri-food sector.

Türkiye also promotes the employment and participation of the youth in the agricultural sector by supporting various national and international projects including the IPARD Programme funded by the EU, and ensuring positive action towards women and the youth in its support programmes.

3.7. Agricultural Employment

Agriculture is a semi-subsistence activity as well as a socio-economic phenomenon. The share of agricultural employment has been falling in Türkiye over the years, yet maintaining its significance in the overall employment considering the number of formal and informal workers in the agricultural sector.

The rate of formal employment in the agricultural sector has decreased by one-third since 1991. This was influenced by such factors as the abandonment of agricultural activities; the rural youth, particularly males, migrating from rural areas to find jobs with social security in other sectors; factors related to social status; low incomes acquired through agricultural activities, accompanied by marketing issues; high production costs; misuse of agricultural lands; inadequate rural living conditions including urbanization pressure and the lack of social infrastructure; the fact that agricultural activities are relatively heavier; climate change and its indirect impacts on agricultural activities, etc [41].

Considering the shift from agriculture towards the services and **manufacturing** industry, the downward trend in agricultural employment still persists; yet agriculture is generally considered a safe sector in periods of crisis, which results in a small increase in agricultural employment rates [42].

41 http://www.tuik.gov.tr/Start.do, accessed: 01.09.2019.
42 http://www.tuik.gov.tr/Start.do, accessed: 01.09.2019

The expected increase in disorganization in the agricultural sector which, together with the shift from agriculture to services and manufacturing industry, will trigger migration from rural to urban areas and city centres require taking additional measures in favour of women and other disadvantaged groups in Türkiye. Additionally, it is crucial to control the rapid disorganization to maintain the current situation and enhance competitiveness in the agricultural sector as well as increasing employment measures and training the youth in the agricultural sector.

Table 10. Employment Rates and Share of the Agricultural Sector in Overall Employment by Year and Sector

Years	Thousand persons					Percentage (%)				
	Total	Agriculture	Industry	Construction	Services	Total	Agriculture	Industry	Construction	Services
2005	19 633	5 014	4 241	1 097	9 281	100.0	25.5	21.6	5.6	47.3
2006	19 933	4 653	4 362	1 192	9 726	100.0	23.3	21.9	6.0	48.8
2007	20 209	4 546	4 403	1 231	10 029	100.0	22.5	21.8	6.1	49.6
2008	20 604	4 621	4 537	1 238	10 208	100.0	22.4	22.0	6.0	49.5
2009	20 615	4 752	4 179	1 305	10 380	100.0	23.1	20.3	6.3	50.4
2010	21 858	5 084	4 615	1 434	10 725	100.0	23.3	21.1	6.6	49.1
2011	23 266	5 412	4 842	1 680	11 332	100.0	23.3	20.8	7.2	48.7
2012	23 937	5 301	4 903	1 717	12 016	100.0	22.1	20.5	7.2	50.2
2013	24 601	5 204	5 101	1 768	12 528	100.0	21.2	20.7	7.2	50.9
2014	25 933	5 470	5 316	1 912	13 235	100.0	21.1	20.5	7.4	51.0
2015	26 621	5 483	5 332	1 914	13 891	100.0	20.6	20.0	7.2	52.2
2016	27 205	5 305	5 296	1 987	14 617	100.0	19.5	19.5	7.3	53.7
2017	28 189	5 464	5 383	2 095	15 246	100.0	19.4	19.1	7.4	54.1
2018	28 738	5 297	5 674	1 992	15 774	100.0	18.4	19.7	6.9	54.9
2019	28 080	5 097	5 561	1 550	15 872	100.0	18.2	19.8	5.5	56.5
2020	27 066	4 515	5 667	1 686	15 198	100.0	16.7	20.9	6.2	56.2

** 2020 November data / Source: TURKSTAT (2020)*

Preventing shadow sector in the agricultural sector should be taken into consideration in policy applications that target employment increase in agriculture. Important actions include improving working conditions for agricultural workers who represent the producer population in the system in terms of the sustainability of food systems, and formalizing especially women's employment in agriculture. In this context, it is crucial to evaluate the informal employment rates in agriculture included in the "rate of individuals without registration with a social security institution in overall employment" data in order to formulate appropriate solutions. As shown in the table, the rate of individuals who work without SSI registration in overall employment in 2019 fell by 8.8% compared to 2010. However, the agricultural sector has increased its percentage in the sectoral distribution of informal employment, comprising 86.6% of informal employment in 2019. When we examine the distribution of informal agricultural

employment by gender, informality rates for women is much higher than for men (16.2% higher in 2019) and the distribution has barely made progress between 2010-2019.

Table 11. Rate of Individuals Who Work Without SSI Registration in Overall Employment, by Year (%)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	43.3	42.1	39.0	36.7	35.0	33.6	33.5	34.0	33.4	34.5
Agricultural Sector	85.5	83.8	83.6	83.3	82.3	81.2	82.1	83.3	82.7	86.6
Male	75.7	72.5	72.6	71.8	71.8	70.2	72.2	74.4	76.2	79.5
Female	96.1	96.2	96.0	96.3	94.4	94.0	94.2	94.2	90.9	95.7
Non-Agricultural Sector	29.1	27.8	24.5	22.4	22.3	21.2	21.7	22.1	22.3	23.0

Source: TURKSTAT Sustainable Development Indicators, 2010-2019

3.8. Gini Coefficient

According to TURKSTAT data, the Gini coefficient[43], which is a benchmark for income distribution inequality was measured as 0.395 in 2019. In this respect, it is at its lowest level compared to 2010. On the other hand, according to the Income and Living Conditions Survey results for 2019, the share of the top 20% quintile by the equivalized household disposable income in overall income fell to 46.3% whilst the share of the bottom 20% quintile increased to 6.2%.

3.9. Financing and Entrepreneurship

As stated in the Agriculture and Forestry Council Agricultural Inputs and Financing Working Group Paper[44], "The primary financial resources for the agricultural sector in Türkiye are equity, credit, grants and incentives, support payments, vendor finance and other resources".

- Lack of medium- and long-term sustainable agricultural policies
- Lack of macro and micro production planning
- Small-scale businesses; highly fragmented lands
- Lack of/poor capital accumulation in general
- Excessive borrowing habits in the sector
- High informality in production, marketing and social security
- Poor agricultural organization and cooperativism
- Poor financial literacy / management in producers
- Over-indebtedness and high debt stocks of some producers
- Lack of instruments to use against uncertainties in the production process in order to mitigate the impacts of the fluctuations in harvest and price
- High interest rates in private banks
- Lack of sustainability of private banks in financing
- Failure to diversify guarantees; failure by financial institutions to evaluate alternative guarantees in general

These were defined as the areas that need improvement (weak points) in the 3rd Agriculture Forest Council

43 It means equality in income distribution as it approaches zero, and deterioration in income distribution as it approaches one. https://data.tuik.gov.tr/Bulten/Index?p=Gelir-ve-Yasam-Kosullari-Arastirmasi-2019-33820. accessed: 25.03.2020.
44 https://cdniys.tarimorman.gov.tr/api/File/GetFile/330/Sayfa/1416/1778/DosyaGaleri/5._tarimsal_girdiler_ve_finansman.pdf

Agricultural Inputs and Financing Working Group Paper.

Depending on the type of aid and products, Türkiye provides aids for plant and animal production to farmers with a minimum of 1 da of land, provided that they are registered with the Farmer Registration System. Information on the available aids can be obtained from https://www.tarimorman.gov.tr/SGB/TARYAT. The aids that are provided by the Ministry of Agriculture and Forestry in Türkiye are under the following topics:

1. Sector-based Supports

2. Biological and Biotechnical Pest Control Support

3. Other Agricultural Supports

4. Livestock Supports

As smallholders are among the most important actors in improving Sustainable Food Systems, Small Family Business for Plant Producers Aid is available under Land-based Aids.

Other than these routine aids, aids that partially qualify as grants are also available to natural and legal entities through projects such as the Rural Development Investments Support Programme carried out by the MoAF and the IPARD programme implemented through the EU-funded Agriculture and Rural Development Support Institute. The IPARD programme, in particular, places the youth and women in an advantaged position. Furthermore, various other programmes and projects that target young individuals have been and are being implemented by MoAF, such as the Expert Hands Project, Programme for Supporting Young Farmers' Projects under Rural Development Aids, the Agricultural Cooperative Projects implemented between 1967-2015, Development Projects (in Ardahan-Kars-Artvin, Sivas provinces) and Social Support Projects in Rural Areas. In addition, agricultural support is also provided by the Regional Development Administrations of the Ministry of Industry and Technology in the provinces within their remit, and by Development Agencies that operate in 81 provinces and especially Metropolitan Municipalities through 26 Level-2 regions and Investment Support Offices. The most well-established institutions in agricultural finance in Türkiye are Ziraat Bank of the Republic of Türkiye and the Turkish Agricultural Credit Cooperatives, making incentives available for businesses.

3.10. Outlook of Sustainable Development Indicators

The report examines various indicators based on the contribution of food systems to sustainable development goals. This data that allows for a better evaluation of Türkiye's contributions to the goals by establishing the current situation of national food systems in terms of agricultural production and activities as well as comparing it with other countries is significant in better determining the goals and actions related to transforming food systems.

This chapter presents some of the indicators which are deemed important to interpret the food systems and have not been addressed in the previous chapters of the report from among the proxy indicators that are deemed appropriate for measuring the relevant goal with regard to those of the global indicators, determined with a view to monitoring the level of achievement of Sustainable Development Goals, which apply to Türkiye.

- Under SDG "Goal 1 - End poverty in all its forms everywhere";
    - The relative poverty rate in Türkiye decreased by approximately 2.5 percentage points in the 2010-2019 period. Based on the poverty line set at 50% of median equalized household disposable income, the rate of poverty which was at 16.9% in 2010 decreased by 2.5 points to 14.4%. While the rate of the population at work and risk of poverty was 17.9% in 2010, it decreased by 4.7 points to 13.2%.[45]
    - The rate of individuals at risk of poverty or social inclusion which was at 65.7% in 2010 decreased by 25.9 points to 39.8%.[46] Based on this indicator, women are in a higher risk group than men.

45 TURKSTAT Sustainable Development Indicators, 2010-2019
46 TURKSTAT Sustainable Development Indicators, 2010-2019

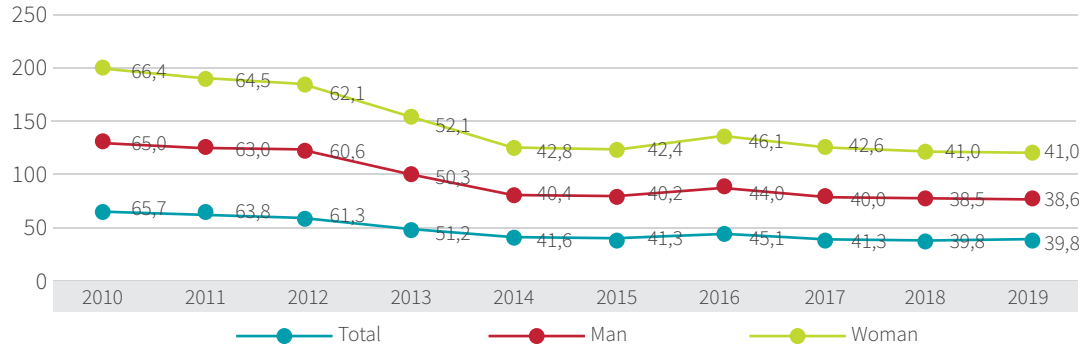


Figure 9. Rate of Individuals at Risk of Poverty or Social Exclusion
Source: TURKSTAT Sustainable Development Indicators, 2010-2019

- Under SDG "Goal 2 - End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

  - According to TURKSTAT data on Sustainable Development Indicators, while the prevalence of growth retardation in children below the age of 5 was at 9.5% in 2013, it fell to 6% in 2018, resulting in an improvement. The prevalence of malnutrition (wasting) among children under 5 years of age, which stood at 1.7% in 2013, maintained its rate in 2018, as well. While the prevalence of malnutrition (overweight) among the said age group was 10.9% in 2013, it improved by 2.8 points, falling to 8.1%.[47] The national situation can be evaluated better if examined on the global scale. According to the figure, Türkiye has a better performance compared to West Asian and global averages in terms of the prevalence of growth retardation, malnutrition (wasting) and malnutrition (overweight) among children under 5 years of age; yet when examining the rankings by country, these rates need to be improved through implementing actions that involve food system transformations. For example, in terms of the prevalence of growth retardation, Türkiye is open to improvement at 6% in the world ranking in which Germany (1.7%), Chile (1.8%) and Australia (2%) comprise the top three best-performing countries[48].

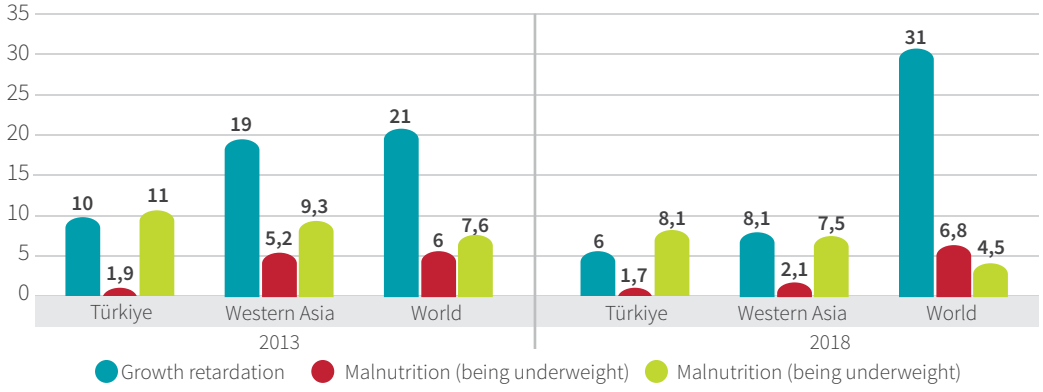


Figure 10. Prevalence of Growth Retardation, Malnutrition (Underweight), and Malnutrition (Overweight) among Children under 5 Years of Age (%)
Source: Formed by the data compiled by the Food System Dashboard from UNICEF/WHO_WB_JMP_2020

47 TURKSTAT Sustainable Development Indicators, 2010-2019
48 http://hdr.undp.org/en/indicators/98306

- Prevalence of growth retardation, malnutrition (wasting) and malnutrition (overweight) among children under 5 years of age (%) The prevalence of obesity in countries is another significant indicator in terms of access to healthy and safe food and nutrition. In our country, the prevalence of obesity saw an upsurge by 10% between 2000-2016, increasing up to 32.1% in the adult population. According to data from 2016, the rate of prevalence of obesity in individuals aged 18 years or above was 13.1% in the world; 35.5% in North America; 22.9% in Europe and 7.3% in Asia[49]. According to this data, Türkiye stands well above the global and European averages, almost catching up to the level of prevalence in North America. In order to reduce such rates, it is crucial to continue the efforts initiated towards access to healthy and safe food for all as well as increasing public awareness of the issue.

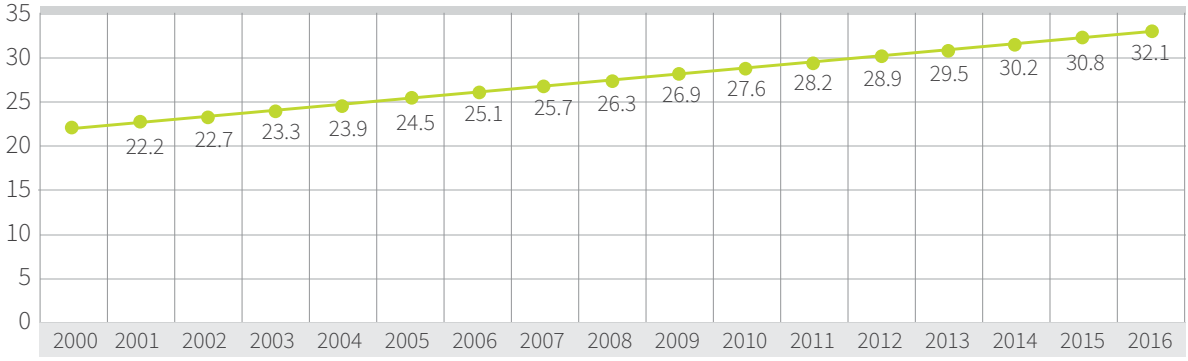


Figure 11. Prevalence of Obesity in Adults (18 years of age and above) %
Source: FAOSTAT

- Under SDG "Goal 13 - Take urgent action to combat climate change and its impacts";
  - » Total greenhouse gas emissions reached 506.1 Mt CO_2 equivalent in 2019. While the total greenhouse gas emissions in Türkiye stood at 399.1 million tons of CO_2 equivalent in 2010, they increased by 26.8% in 2019, reaching 506.1 million tons of CO_2 equivalent. While the energy sector accounted for the largest share of CO_2 equivalent in 2019 emissions with 72%, the agricultural sector accounted for 13.4% of the share in emissions with 68 million tons of CO_2 equivalent[50].

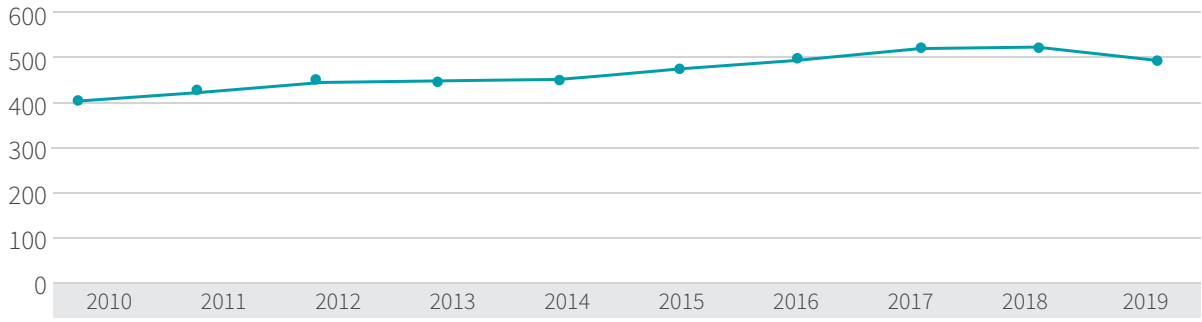


Figure 12. Annual Greenhouse Gas Emission (Million tons of CO_2 equivalent)
Source: TURKSTAT

When we examine the worldwide change in annual greenhouse gas emissions, the rates increased by 32 million tons from 2013 to 2017, whereas the change in Türkiye during the same period was higher (102 Mt CO_2).

49 FAOSTAT
50 TURKSTAT Greenhouse Gas Emission Statistics, 1990-2019

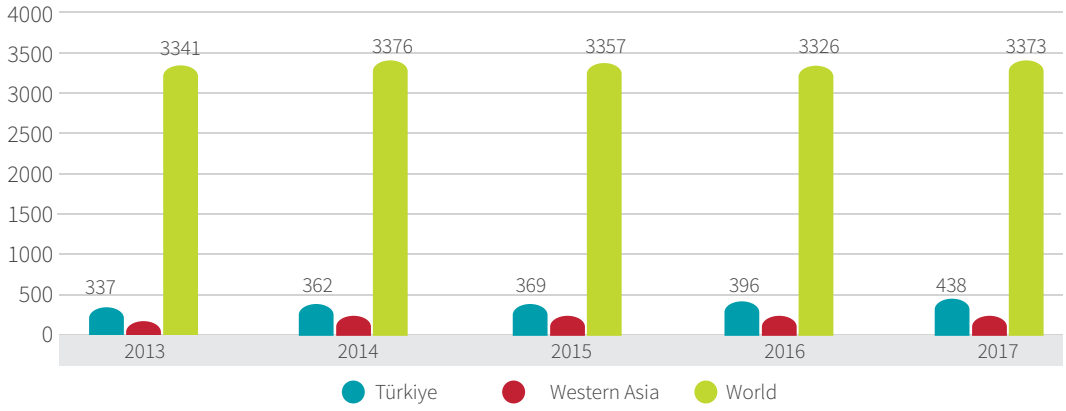


Figure 13. Greenhouse Gas Emissions ($MtC0_2$) (including land use change and forestry)
Source: Türkiye

According to the following table, which establishes our national profile in terms of climate change and environmental sustainability, Türkiye ranks higher than world averages in carbon dioxide emissions per capita, fossil fuel energy consumption and fresh water withdrawals.

Table 12. Environmental Sustainability Indicators

Year	Indicator	Türkiye	World
2018	Carbon dioxide emissions, production emissions per capita (tons)	5.2	4.6
2017	Carbon dioxide emissions, per unit of GDP (kg per 2010 US$ of GDP)	0.19	0.26
2015	Degraded land (% of total land area)	9	20
2017	Domestic material consumption per capita, (tons)	18.7	12.3
2016	Forest area (% of total land area)	15.4	31.2
1990/2016	Forest area, change (%)	22.8	-3
213-2015	Fossil fuel energy consumption (% of total energy consumption)	86.8	80.6
2017	Fresh water withdrawals (% of total renewable water resources)	27.8	7.7
2016	Mortality rate attributed to household and ambient air pollution (per 100,000 population, age-standardized)	47	114
2016	Mortality rate attributed to unsafe water, sanitation and hygiene services (per 100,000 population)	0.3	11.7
2018	Natural resource depletion (% of GNI)	0.2	1.3
2019	Number of deaths and missing persons attributed to disasters (per 100,000 population)	0.1	0.7
2018	Use of fertilizer nutrient nitrogen (N), per area of cropland (kg per hectare)	65.9	69.7
2018	Use of fertilizer nutrient phosphorus (expressed as P2O5), per area of cropland (kg per hectare)	22.5	26

Source: Source UNDP Human Development Reports, Türkiye

4

FOOD SECURITY

According to the FAO Report on the State of Food Security and Nutrition in the World (SOFI 2020), almost 690 million people in the world (8.9 per cent of the world population) were malnourished in 2019, before the COVID-19 pandemic. Estimates for 2019 reveal that an additional 60 million people have become affected by hunger since 2014. If this trend continues, the number of undernourished people will exceed 840 million by 2030, risking the achievement of Sustainable Development Goal No. 2 of Zero Hunger as determined by the UN through the 2030 Agenda, even without the negative effects that COVID-19 will likely have on hunger.

It is estimated that the COVID-19 pandemic has added an additional 83 to the 132 million people to the ranks of the undernourished in 2020. Beyond hunger, a growing number of people have had to reduce the quantity and quality of the food they consume. Two billion people, or 25.9 per cent of the global population, experienced hunger or did not have regular access to nutritious and sufficient food in 2019. This situation could deteriorate if we do not act immediately.

These trends in food insecurity contribute to increasing the risk of child malnutrition, as food insecurity affects diet quality, including the quality of children's and women's diets, and people's health in different ways. In 2019, 144 million children under 5 years of age were estimated to be stunted, 47 million wasted and 38.3 million overweight, while at least 340 million children suffered from micronutrient deficiencies. Furthermore, adult obesity is on the rise in all regions.

According to the 2020 Hunger Map[51], Türkiye, Kazakhstan and Azerbaijan rank below 2.5%, Kyrgyzstan between 5-14.9% and Uzbekistan below 5% in terms of the prevalence of malnutrition in the total population between 2017-2019.

4.1. COVID-19 Pandemic

According to SOFI 2020 by FAO, close to 750 million people were exposed to severe levels of food insecurity. Posing a serious risk in terms of food security, COVID-19 added between 83 and 132 million people to the total number of undernourished in 2020. Agriculture, which is extremely important in ensuring food security, is among the economic sectors that maintain its significance due to the share of Türkiye in agricultural employment and Gross Domestic Product (GDP) and the fact that Türkiye is a net agricultural product exporter. COVID-19 has had unfavourable impacts on the agri-food sector in the world as well as in Türkiye. Although Türkiye has taken measures against COVID-19 and does not anticipate problems related to food security and safety, the agri-food industry has become exposed to various challenges, i.e., production losses, lack of temporary labour; reduced farmer and labourer incomes and sales; fluctuating product prices; export/import restrictions; changes in tariffs, marketing channels, customer attitudes, imports of agricultural inputs; the structure of small-scale, subsistence and semi-subsistence farms are some of the challenges faced by the sector. Temporary quarantine practices have also had unfavourable impacts on smallholders whose income largely depends on neighbourhood markets and have difficulty accessing markets. According to the World Bank (2020), 270,000 jobs in field agriculture were lost (the rate of agricultural sector workers affected by COVID-19 was 28%) and agricultural employment is vulnerable to shocks. COVID-19 has led various retailers in Türkiye to make their conventional systems compatible with online delivery. According to the world bank, the digitalization of agriculture and food supply and distribution channels can provide ways for Türkiye to modernize the agricultural food system, which involves the expansion of e-commerce, and digital technologies to associate producers and traders, processors and buyers with COVID-19.

There are currently various restrictions that endanger the sustainability of agricultural supply in the world. Vital pressures on agricultural production ecologies, such as climate change, growing population and industrial production are all forms of global risks; yet we failed to predict the potential risks of a global

51 https://www.wfp.org/publications/hunger-map-2020

pandemic on agricultural production until 2019.

Various measures were formulated and implemented by the Ministry of Agriculture and Forestry as a result of the COVID-19 pandemic that began spreading to the world from China to EU countries, and finally to our country in 2020.

As part of COVID-19 measures, a special public service announcement was prepared by the Ministry, describing the measures to be taken for farmers and those for the fields in order to contribute to the awareness raising activities aimed at relevant segments of the society. Relevant information is available at https://www.tarimorman.gov.tr/Sayfalar/Detay.aspx?SayfaId=52. In this process, relevant Ministries, and notably the Ministry of Health and the Ministry of Trade, carried out efforts to ensure maximum close coordination, attributing special importance to the views of non-governmental organizations, the academia, other public and private sector institutions and professional chambers in formulating measures. The recommendations and suggestions presented by the Science Committee, which was established under the Ministry and comprised 9 members, were implemented during this process. The Measures for Plant Production in Agricultural Lands in the COVID-19 Period are listed below.

In this framework, efforts are currently carried out to continue sowing, planting, fertilizer application, irrigation, pesticide application, hoeing, general care, etc. in production with a view to the following:

- Enabling all farmers to access their lands, gardens, greenhouses or farms; granting exemptions for the uninterrupted continuation of the production, access and distribution of agricultural inputs such as fertilizers, seeds, pesticides, feed, etc.,
- Facilitating agricultural workers' access to hygiene and protective equipment; regulating the transfer and accommodation conditions for seasonal agricultural workers to allow them to continue their activities,
- Carrying out efforts in coordination with the Ministries of Interior, Health and Trade to provide logistics opportunities to ensure the uninterrupted market supply of harvested products; through the Provincial Pandemic Board, ensuring the performance of works and procedures to ensure province-wide coordination during the COVID-19 pandemic as a result of such efforts,
- Ensuring the cultivation of strategically important products with a supply deficit by launching a summertime cultivation programme to ensure sustainability in plant production and by distributing seeds to producers through 75% grants in areas allowed by the agricultural schedule,
- Planting seeds in an area of 350,000 da in a limited time; distributing 6,100 tons of wheat, barley, lentil, dried beans, maize, sunflower and rice seeds
- Reintroducing idle lands in agricultural production; planning for making unused agricultural lands that are owned by the Treasury available to farmers' use for model cultivation purposes in order to ensure sustainability in agricultural production for further convenience of our farmers and to maintain food supply security (It is aimed to cultivate strategic products such as grains, legumes, oily seeds and fodder crops in a total area of 9 million 700,000 m^2 in the first stage, and to that end, close cooperation and coordination was established with the Ministry of Agriculture and Urbanization)
- Together with our producers, making arable lands available for agriculture in the upcoming period; meeting the needs of our country as well as becoming a country that supplies the world with our own cultivated products
- In coordination with the Ministry of Environment, Urbanization and Climate Change, the Treasury-owned lands were allocated to Provincial Directorates in provinces, where the agricultural schedule allows, in order to reintroduce idle Treasury-owned lands to agricultural production. Efforts are continued in order to identify those among the allocated lands that are arable, followed by model cultivation practices with producers.

Furthermore, within the framework of combating COVID-19; rental payments for Treasury-owned agricultural lands leased to farmers for April, May and June were deferred for a period of 6 months. This application covers 51,000 farmers with whom lease contracts were made on close to 600 million m^2 of land, supporting our farmers during this challenging period.

On the other hand, the Ministerial Directorate General of Agricultural Research and Policies (DGARP) which has the largest R&D infrastructure of the country has carried out, and continues to carry out, various scientific and practical studies on sustainability of agricultural production and food supply.

Within the framework of the conservation and sustainable management of soil and water resources;

1. The security of agricultural production, as well as agricultural sustainability for food security, is crucial in order to meet basic food needs and ensure the necessary agricultural supply within the frame of the measures taken in such processes as an outbreak. One of the most important inputs in agricultural sustainability is irrigation water. The impacts of the rapidly spreading COVID-19 pandemic which has taken our country and the world by storm, once again, unveiled the prominence of hygiene, and consequently, water in our life cycle. In this context, the water withdrawn by each individual during the hygiene process causes the wasting of 1 litre of water in each handwash; accordingly, 80 million individuals throughout the country waste 12 million m^3 of water within a month. The fact that this quantity meets the yearly irrigation needs of roughly 24 da of land indicates the significance of the water savings in this scope for the agricultural sector as well as sustainable food security in the future. In this regard, as part of extension works, awareness raising activities are carried out for local farmers on reducing water consumption through public service announcements, hand brochures, etc. In the event of potential risks and agricultural drought, a certain quota can be imposed on the areas irrigated using the surface irrigation method in order to limit the products with excessive water consumption.

2. Increased water consumption due to the pandemic will also increase our future needs, particularly for agricultural water. The Ministry continues to make investments to extend modern irrigation systems, ensure water-saving in agriculture, enhance the incomes of farmers directly and indirectly, and contribute to national agriculture. Surely, any measure is extremely critical in terms of preparedness for such unexpected events today and in the future. Our farmers are encouraged to use pressurized irrigation (drip and sprinkling) systems through training programmes on limited irrigation, the benefits of which have been established by R&D works, in a way that will not lead to any yield loss. With regard to using marginal waters in irrigation in extreme cases, it seems possible to reuse treatment and drainage waters in a controlled manner in irrigation. In such cases, lands should not be left idle, and the products that require less water but that can be further productive through irrigation, as well the areas in which to produce such products, should be increased.

3. Efforts are underway to establish appropriate technology and irrigation programmes for the optimum use of irrigation water under limited water circumstances in dry periods. Works are continued to extend the species with high water consumption efficiency and ensure the extensive production of drought-tolerant varieties in suitable regions, in addition to identifying alternative plant species to be included in the product pattern.

4. On-field implementation of projects to minimize the need for labour and ensure farming by significantly reducing energy costs is extremely important. Such periods require a serious quantity of energy, which farmers can have difficulty meeting such costs, resulting in electricity cut-offs. Farmers particularly have problems with paying for electricity, diesel fuel, gasoline as well as irrigation water. Making use of patented projects (e.g., Mobile Solar Cell Irrigation Machine - Particularly Drip Irrigation System, Solar Cell Pivot Irrigation System, etc.) developed by the GAP Agricultural Research Institute on using solar energy in agricultural irrigation will make significant contributions for producers to meet their energy needs.

5. In the event that the human factor becomes functionless, as is the current case, reintroducing machinery and automation systems to the agenda based on an Agriculture 4.0 approach, and carrying out works by considering the needs for research projects on automated irrigation, energy systems, etc. and making legislation in accordance with technology will ensure the efficient use of water resources.

6. With regard to agricultural production; agricultural activities were disrupted due to the COVID-19 pandemic that occurred at the peak of the period when soil preparations, fertilizer application and pruning needs were required. Efforts regarding transitioning to automation systems that do not depend on human labour and using satellite images and/or field-scale remote sensing data in the control, automation and management of irrigation systems will ensure sustainable land management.

7. Two-thirds of food production in Türkiye is based on production at irrigated agricultural lands. Climate change and unexpected potential risks threaten water resources, disrupting the sustainable agricultural system. Increased water consumption due to the pandemic will also increase our water needs in the future. It is crucial to raise the awareness of local farmers on water saving and conscious irrigation, and enhance incentives and support towards water-saving pressurized irrigation systems. Efforts can be carried out to extend the availability of drip irrigation systems for products with high water consumption, such as rice.

On the other hand, some countries that have been combating the COVID-19 pandemic are conducting various scientific research on the presence of the novel coronavirus (SARS-CoV-2) in wastewaters and their potential adverse impacts in order to produce information on the country-wide spread and direction of the virus and take the necessary measures as a result of the knowledge and findings obtained, by monitoring the virus contained in wastewaters.

The DGSHW of MoAF is responsible for the planning, management, conservation, improvement and operation of national water resources; in this regard, it engages in intensive efforts for the sustainable use of our water and soil resources through enhancing water storage capacities, supplying drinking-utility and irrigation water, drinking and wastewater treatment plants, flood protection efforts, building hydroelectrical energy generation plants and making environmentally conscious investments..

4.2. Health and Nutrition

At the informative meeting held by the World Health Organization under the Summit on 12 January 2021.

It was indicated that the COVID-19 pandemic demonstrated that the current health and food systems were not resilient enough to crises; the Action Track objectives set as part of the Summit were closely associated with health; food was not limited to the Sustainable Development Goal No. 2 only and that its prominence extended from all areas, and particularly health, education and social security; a large part of diseases were related to nutrition; and the COVID-19 pandemic had major impacts on nutrition.

According to the SOFI (2020) report by FAO, it is estimated that the COVID-19 pandemic has added an additional 83 to 132 million people to the ranks of the malrnourished in 2020. Beyond hunger, a growing number of people have had to reduce the quantity and quality of the food they consume. Two billion people, or 25.9 percent of the global population, experienced hunger or did not have regular access to nutritious and sufficient food in 2019. This situation could deteriorate if we do not act immediately.

While the world combats hunger and malnutrition, it also grapples with obesity which causes various health problems. To top it all off, FAO indicates that 1.3 billion tons of food, which corresponds to nearly one-third of the food produced for human consumption purposes, is lost or wasted each year, leading to social, economic and environmental issues and most importantly, climate change problems. According to World Bank (2020), unsold agricultural products are lost or wasted in the production, transport, retail, sales and consumption stages of national food chains, which was also the case even before COVID-19. The area required to produce the quantity of food that has been lost or wasted is almost the size of China.

The “Carcinogenicity of the Consumption of Red Meat and Processed Meat” report by the International Agency for Research on Cancer (IARC), an organ of the World Health Organization, asserts that processed red meat is classified as Group 1 carcinogenic food group due to such processes as salting, curing, fermentation, smoking or other processes to enhance flavour or improve preservation; and red meat is classified as

Group 2A, i.e., probably carcinogenic to humans.

Fatty meats should be consumed carefully by individuals with coronary heart disease, diabetes, hypertension, etc. due to their high saturated fatty acid and cholesterol content. “Food and Beverage Standards” were established in Türkiye by the Ministry of Health and pursuant to the relevant Communiqué, the sale of processed meat products in school canteens were prohibited and salt quantities were reduced in red meat products by the Ministry of National Education. In addition, TV advertisements targeting children are only allowed to advertise processed meats within the framework of specific criteria (a total of 20 g fat and 1.7 g salt content per 100 g of product, etc.).

Furthermore, Dietary Guidelines for Türkiye (TÜBER) was formulated by the Ministry of Health in 2015 based on national and international guidelines and literature. Processed meat products should be evaluated in the optional preferences class and their consumption decreased to a minimum quantity, given their high sodium content. On the other hand, according to the results of the Türkiye Nutrition and Health Survey of 2017, the daily average consumption of red meat for individuals aged 15 years and above was 39.1 g. According to the outcomes of the survey, which also determined the consumption quantities of processed meats other than red meat according to age groups and gender, the consumption of red meat in Türkiye is not higher than the recommended quantities [52].

4.3. Climate Change

The most significant problems caused by climate change include the imbalanced distribution of precipitation which leads to drought and flooding. Since water alone is the most restrictive factor for the growth of plants, water resources are unavoidably used in agricultural production to ensure sustainable water supply and maintain our national competitiveness in agriculture. As it is known, drought stress alone is expected to limit more than half of the arable lands on Earth. Contrary to popular belief, Türkiye is among the countries that is experiencing water scarcity.

According to a report published by the Union for the Mediterranean (UfM), the Mediterranean is the most affected by climate change. The average annual temperatures in the Mediterranean region are approximately 1.5°C °Chigher than during the pre-industrial period, increasing by an average of over 0.4°C ccompared to the temperature increase in other regions. By 2040, the temperature increase in the Mediterranean is expected to reach 2.2°C, leading to a decrease in agricultural and aquaculture products caused by drought. According to a report by the Intergovernmental Panel on Climate Change (IPPC), global warming increases drylands and desertification and the frequency and intensity of droughts are anticipated to increase in South Africa and the Mediterranean; and drought is accompanied by such adverse impacts as forest fires, loss of biodiversity and changes in production patterns, soil erosion and food supply risks. As shown on the maps produced by the General Directorate of Meteorology, water use is triggered by the COVID-19 pandemic, leading to a risk of water stress due to decreasing fill rates in dams, especially in metropolitan cities such as Istanbul, Ankara and Izmir, caused by low precipitation.

The negative impacts of climate change significantly trigger drought stress in certain parts of the world, including certain areas in Türkiye. Therefore, the National Agricultural Drought Strategy and Action Plan (2018-2022) was drafted in the context of combating agricultural drought. The main components of the Action Plan include setting up a competent institutional building, adopting a holistic and comprehensive perspective and making the agricultural sector further resilient to drought. The activities were categorized under five headings in the Action Plan, which are i) drought risk estimate and crisis management, ii) ensuring sustainable water supply, iii) efficient management of agricultural water demands, iv) increased support to R&D activities, training and extension services, v) institutional capacity building. In addition to the agricultural policy frameworks, water governance also plays a crucial role in addressing the risk of drought. Drought Management Plans at the river basin scale constitute an integral part of the Agricultural Drought Strategy; they analyse the four types of drought risks based on climate and hydrological research and determine sectoral vulnerabilities, after which they determine drought prevention measures and the improvement

52 The guidelines and the relevant documentation are available at https://hsgm.saglik.gov.tr/tr/beslenmehareket-yayinlar1/beslenmehareket-kitaplar.

and response measures to be implemented during and after drought. More specifically, Drought Action Plans were formulated and provincial Crisis Management Centres for Agricultural Drought were established by the Ministry of Agriculture and Forestry.

Taking into consideration the fact that over 70% of our national water resources are used in agricultural production, extending the use of renewable energy resources in agriculture will ensure food security during a pandemic; various practices have been and are currently being implemented, such as using irrigation water efficiently, extending modern irrigation techniques and investments to reduce the pressure on groundwaters, moving dams underground, extending rainwater harvesting in cities, including drought in the scope of TARSIM, extending drought-resilient species and implementing the Drought Action Plans.

4.4. Food Security Actions

The Republic of Türkiye is responsible for the adequate and balanced nutrition of the public as well as ensuring the safety of the foods consumed by the public. Türkiye adopts the principle of safety from food to table for each article of food consumed. The General Directorate of Food and Control of the Ministry of Agriculture and Forestry and Provincial/ District Directorates of Agriculture and Forestry are responsible for ensuring that the public consumes safe food, eats healthy foods and therefore maintains their health. The notable regulations within the legal framework on Food Safety include the following:

Law No. 5996 on "Veterinary Services, Plant Health, Food and Feed", which was brought into force in 2010, aims to protect and ensure public health, plant and animal health, animal improvement and well-being and consumer interests, taking into consideration environmental protection. The law covers all stages of production, processing and distribution of food, materials and articles intended to come into contact with foodstuffs and feed, controls of residues of plant protection products and veterinary medicinal products and other residues and contaminants, control of epidemic or contagious animal diseases and harmful organisms in plants and plant products, the well-being of farm and experimental animals and pet animals, zootechnics, veterinary and plant health services, entry and exit procedures for live animals and products into and out of the country as well as relevant official controls and sanctions in this regard.

In order to ensure food safety in Türkiye, official controls including various services and techniques such as those involving business registrations, suspicions, complaints, monitoring, traceability, oversight and inspection are carried out in all stages from primary production to delivery to the consumer.

The official controls by the Ministry are conducted on a risk basis, without prior notice. Also, sampling is done in addition to the Ministerial and Provincial annual sampling programmes and the National Residue Monitoring Programme (UKIP) as well as for those that were reported due to suspicion, complaint, notification or under the complaints filed at TIMER (Agricultural Communication Centre), CIMER (Presidential Communication Centre) and ALO 174 Food Hotline.

In this framework, a total of **1,356,643 inspections** were carried out at food businesses throughout Türkiye **in 2020.** The inspections are carried out by a total of **7,137 food control officials** across 81 provinces.

Türkiye continues introducing both legislative and official control practices in accordance with EU regulations in order to ensure food safety, prevent counterfeiting and adulteration, protect public health and prevent consumer deception as well as prevent unfair competition in the sector.

Law No. 7255 on Introducing Certain Regulations in the Fields of Food, Agriculture and Forestry and Amending Law No. 5996 was brought into force upon its publication on 4 November 2020, aiming for the maximum protection of consumer health and interests and ensuring further deterrence of the penal clause for counterfeiting and adulteration in food.

The amendment introduced with Article 30 of the Law imposed heavier sanctions on food businesses that produce and put counterfeit and adulterated food on the market and retail food businesses that supply such foodstuffs to the market. Accordingly, it was stipulated to implement deterrent fines against fraudulent practices such as counterfeiting and adulteration in foodstuffs by imposing deterrent sanctions such as

imprisonment, judicial fines, ban from engaging in food sector activities and judicial fines up to 500,000 TRY on food businesses that commit such crimes.

The risk analysis system, which is currently the globally recognized approach in ensuring food safety and thus protecting human health, was adopted with Law No. 5996. The risk analysis system consists of three fundamental components, which are risk assessment, risk management and risk communication. The three-component system is implemented in all steps in the food chain, including plant and animal health. In order to ensure that the activities as part of the "risk assessment" component of risk analysisare carried out are carriedout in an internationally acceptable and scientific manner, "Scientific Commissions" through which scientific studies are carried out were established by MoAF.

Scientists from different universities/faculties/departments and areas of study continue their studies under 7 Scientific Risk Assessment Commissions established under the Ministry. The Scientific Commissions form advisory scientific opinions on the MoAF applications in food safety, establishing a sound scientific basis for making legislation and formulating new food policies, and taking risk management decisions consciously and efficiently.

The Regulation on Special Hygiene Rules for School Canteens lays down the rules regarding special hygiene standards, food safety and official controls in food establishments such as dining halls, canteens, cafeterias, buffets, tea shops that are affiliated with the Ministry of National Education (MoNE) and operate under educational institutions. The Communiqué on School Food (Communiqué No. 2020/23) regulates the required school food specifications for pre-packaged foodstuffs that are made directly available for sale to or consumption by students in food establishments such as canteens, cafeterias, buffets, tea houses, etc. that operate in schools/institutions affiliated with the MoNE, and the school food logo to be used on such foodstuffs.

The Turkish Food Codex Regulation lays out rules for the minimum technical and hygienic criteria for materials and articles intended to come into contact with foodstuffs; residues of pesticides and veterinary drugs in foodstuffs; food additives; flavourings and certain food ingredients with flavouring properties; contaminants; packaging, labelling, sampling and analysis methods; vertical and horizontal food codex principles for transportation and storage, and special provisions regarding geographical indicators [53].

Law No. 5977 on Biosafety lays out principles and procedures related to implementing a biosafety system in order to prevent the potential risks of genetically modified organisms and products obtained through modern biotechnological means within the context of scientific and technological advancements; protect human, animal and plant health; safeguard and ensure the sustainable use of the environment and biological diversity and the control, regulation and monitoring of such activities[54].

The 174 ALO Food Hotline was established by the MoAF in order to ensure the consumption of safe foodstuffs. It became operational on 14 February 2019 with a view to ensuring easy access by consumers with regard to information requests, reports and complaints related to food safety, ensuring that the communication is guided from a single centre, and the ability to respond to consumers within the shortest time possible and following up on the outcomes. MoAF carries out inspections at food businesses upon consumer complaints filed at "174 ALO Food Hotline" in order to ensure food safety.

Per capita salt consumption in Türkiye is nearly three times the value recommended by the World Health Organization. Efforts are carried out by MoAF to reduce salt content in processed foods, in the context of which salt additives in certain foodstuffs were reduced [55].

Risk-based inspections within the frame of the applicable legislation are conducted by MoAF official control officers at the selling and production places of food supplements and the actual import stages of such products, taking product samples where necessary. In the event that any adversity is identified in the inspections and controls, legal action is taken within the framework of the legislation, such as judicial fines, filing criminal complaints at the Chief Public Prosecutor's Office, and collecting products off the market.

53 https://www.tarimorman.gov.tr/GKGM, accessed: 30.10.2019
54 https://www.mevzuat.gov.tr, accessed: 11.09.2019.
55 https://www.tarimorman.gov.tr/GKGM, Accessed On: 30.10.2019.

On the other hand, through the project carried out regarding the monitoring of the COVID-19 (SARS-CoV-2) Virus, which has caused the pandemic that has taken hold of the entire world since the beginning of 2020, through samples taken from wastewater treatment plants in 81 provinces throughout Türkiye and the efforts carried out under the report entitled "An Evaluation of the Infection Risk of the Virus from the Perspective of Reusing Wastewaters", steps are taken towards assessing the risks related to the detection of treated wastewaters that reach the rich product patterns and vegetables suitable for raw consumption, thus ensuring food safety.

4.5. Food Loss and Waste

While the world combats hunger and malnutrition, it also grapples with obesity which causes various health problems. To top it all off, FAO indicates that 1.3 billion tons of food, which corresponds to nearly one-third of the food produced for human consumption purposes, is lost or wasted each year, leading to social, economic and environmental issues and most importantly, climate change problems. According to World Bank (2020), unsold agricultural products are lost or wasted in the production, transport, retail, sales and consumption stages of national food chains, which was also the case even before COVID-19. The area required to produce the quantity of food that has been lost or wasted is almost the size of China.

Carrying out efforts for food safety is an important prerequisite for healthy nutrition and makes significant contributions to reducing food loss and safety as well as to food security and safety. The "Bread Waste Prevention Campaign" launched under the leadership of President Recep Tayyip ERDOĞAN on 17 January 2013 aims to raise public awareness of wasting, prevent wastage in the stages of production and consumption, ensure the preservation of bread through appropriate methods and extend the consumption of whole-wheat bread. As part of the Campaign, logos, posters and billboards were designed, research books on bread wastewaste and Stale Bread Recipes Book were published, and campaign offers, public messages and films were announced through visual and auditory media channels.[56] The website http://www.ekmekisrafetme.com was established to announce the efforts carried out under the Campaign, The Campaign received news coverage of over 1,600 news items on television and over 11,000 news items on local, regional and national print media. Under the Campaign, which was supported by all segments of the society throughout the country, close to 1,400 organizations were held with the participation of a total of 825 institutions and organizations. In this frame;

- As a result of the awareness raised through the campaign, people began to consume bread more carefully and buy only as much as they need; the total spending on food consumption dropped from 26 billion TRY to 23.5 billion TRY in a year, resulting in 2.5 billion TRY in savings.
- Through preventing wasting bread, the monetary equivalent of the waste decreased from 1.6 billion TRY to 1.3 billion TRY, sparing 300 million TRY worth of bread from going to waste.
- As a result of the awareness raised by the campaign for healthier bread consumption, the consumption of whole-wheat bread raised by 93% and brain bread by 283%.

Campaign activities gained recognition on international platforms, including the following:

- The Bread Waste Prevention Campaign was recognized in 2014 by the Food and Agricultural Organization of the United Nations (FAO) as a good practice contributing to actions on preventing waste in the world.
- The Campaign was mentioned in the "OECD-FAO Agricultural Outlook 2014-2023" published annually by the Organization for Economic Cooperation and Development.
- Türkiye participated in various platforms involving the G-20, International Agricultural Development Funds (IFAD), Organization of Islamic Cooperation (COMCEC), Black Sea Economic Cooperation Organization (BSEC) and International Agricultural Fairs in Budapest, Rome, Bucharest, etc.
- The campaign efforts carried by the Turkish Grain Board and their results were featured in the FAO presentation for the "Global Initiative on Food

56 https://Ekmekisrafetme.com, Accessed On: 30.10.2019

Loss and Waste Reduction" at the Conference of the Parties on Climate Change (COP21) held in Paris between 30 November-12 December 2015 and attended by the President of the Republic of Türkiye.

Some initiatives pioneered by Türkiye on food safety and the reduction, prevention and management of food loss and waste include;

They are as follows;

- The 'Technical Platform on the Measurement and Reduction of Food Loss and Waste' was brought to the agenda during the G20 Term Presidency of Türkiye, and subsequently implemented in Rome,
- Türkiye led the establishment of the "Regional Cooperation Centre for Sustainable Food Systems" in Türkiye under the Leadership of the Black Sea Economic Cooperation (BSEC)
- The Economic Cooperation Organization Regional Cooperation Centre for Food Security was established in Ankara in cooperation with FAO, with the economic contributions of the Republic of Türkiye.

According to TURKSTAT data (2020), 19.1 million tons of food is lost or wasted per year and 4.9 million loaves of bread go to waste on a daily basis in Türkiye. The largest amount of loss occurs in fresh produce and nearly half of the products are lost. According to FAO data, malnutrition in children is decreasing while adult obesity and anaemia are on the rise among females in Türkiye. Reducing the loss and waste of food, which unquestionably contributes to food security, is an integral part of enhanced sustainable food systems.

As defined by the World Bank, reducing food waste by 20% would provide enough food to feed 25 million people. Therefore, reducing food losses and wastes will contribute positively to food security and nutrition, sustainable food systems, the economy and the environment (e.g., climate change, preventing the loss of water that is required to produce food). Food loss and waste also have social influence over work productivity and wages.

In that regard, in recent years, the Ministry of Agriculture and Forestry has put on the agenda the issues of ensuring food security and combating food loss and waste, which contributes to ensuring food security. It has carried out various efforts and projects on a national and international scale.

On the other hand, Goal 12.3 of the Sustainable Development Goals, which is also applicable for our country, sets the following objective: "By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses". Priority Development Areas of the Eleventh Development Plan, which covers 2019-2023, stipulates the following measures under the policies and measures heading of the Agriculture section:

411. The rules and capacities for market regulation will be improved in order to ensure food safety, efficient inventory management, reducing losses in the supply chain and preventing waste.

411.3. Consumer awareness will be increased to prevent food losses and waste."

Furthermore, the Conclusion Statement of the 3rd Agriculture Forest Council, announced to the public by President Recep Tayyip ERDOĞAN includes the following action:

"ACTION NO: 3 - ESTABLISHING THE INFRASTRUCTURE TO PREVENT FOOD LOSS AND WASTE"

The most recent effort carried out on combating food losses and waste by the Ministry of Agriculture and Forestry in order to accomplish our international priorities and national policies, measures and actions is the **"SAVE YOUR FOOD - YOUR ACTIONS MATTER CAMPAIGN"**[57] launched after being announced to the public in May 2020, with a view to combatting food losses and waste across Türkiye. The **"National Strategy Paper and Action Plan on the Prevention, Reduction and Monitoring of Food Loss and Waste"** [58] was also publicly declared along with the campaign. The main goals of the campaign are:

- REDUCING/PREVENTING FOOD LOSSES AND WASTE on the national and international scale
- Raising AWARENESS on reducing and preventing food losses and waste

57 All information and documents related to the campaign can be accessed at https://www.gidanikoru.com/.
58 http://www.fao.org/documents/card/en/c/cb1074tr

- Making Turkish BEST PRACTICES A ROLE MODEL IN THE INTERNATIONAL ARENA
- Supporting the national "ZERO WASTE PROJECT" carried out by the Ministry of Environment and Urbanization under the auspices of Emine ERDOĞAN
- Promoting the "BREAD WASTE PREVENTION CAMPAIGN" launched in 2013 by President Recep Tayyip ERDOĞAN and carried out by the Turkish Grain Board

In addition, Türkiye launched a national campaign entitled "Make a Pledge to Break the Record!" under the "Save Your Food-Your Actions Matter" Campaign, with the aim of increasing the level of awareness in combating food loss and waste. The national campaign made a public call to combat food loss and waste through an electronic pledge that read;

"I promise that I will appreciate every bite and sip I take; with all my strength, I will take individual responsibility to prevent food loss and waste and their negative impacts on the environment; I will buy and consume as many items of food and beverages as I need, and not let them go to waste". Furthermore, efforts were initiated to plant saplings on behalf of the pledgees in order to contribute to protecting the environment and mitigating the adverse impacts of climate change. This initiative was extremely helpful in ensuring the ownership of the Save Your Food Campaign by the public. The Guinness World Record for "the campaign with the most pledges in the world on environmental sustainability" was broken with 790 000 pledges made through the "Make a Pledge to Break the Record!" movement. Further efforts on the subject are continued at the national and international levels.

In this regard, Türkiye has addressed the issue of food loss and waste in a broader framework related to the reduction, prevention and management of food loss and waste.

5

AGRICULTURAL ACTIVITIES

5.1. Plant Production

Türkiye has huge potential for plant production with its suitable geographic, climatic, and soil conditions, arable land, microclimate areas, and rich production variety. Türkiye is among the most important producers of certain crops in agricultural production in the world, being the 7th largest agricultural producer in the world and the leading country of Europe in agricultural production.

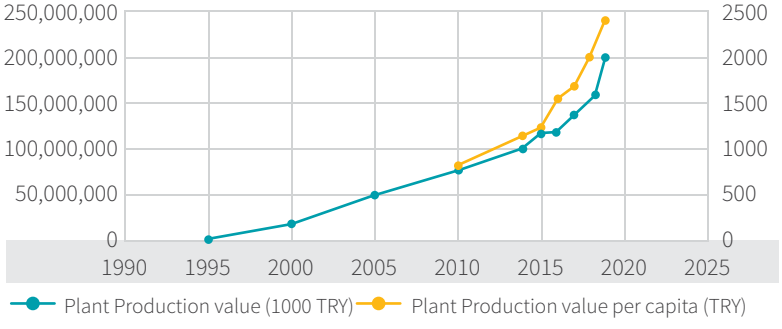
According to FAO data, Türkiye is the leading producer of hazelnuts, cherries, figs, and apricots, the second largest producer of melons, the third largest producer of mandarin, apple, tomato, watermelon, pepper, spinach, and cucumber, and the fourth largest producer of pistachio, pear, strawberry, and eggplant in the world.

Türkiye is the leading producer of apricot in the world with an annual production of between 750 and 985,000 tons, with a production of 846,000 tons in 2019. Türkiye's hazelnut production in 2019 was 776,000 tons, corresponding to 69% of global hazelnut production. Hazelnut is the other product where we are the leading producer in the world. Having provided 23.6% of the global fig production in the last year, Türkiye also provided 25.5% of the global cherry production with 664,000 tons.

Based on the recent statistics, Türkiye's fruit production increased from 14.2 million tons to 23.6 million tons, vegetable production increased from 25.8 million tons to 31,2 million tons, and field crop production increased from 63.7 million tons to 131.9 million tons, with total plant production increasing from 103.7 million tons to 186.7 million tons. Türkiye is one of the leading producers of grains with a grain production of 37.2 million tons in 2020. Türkiye has agricultural areas that are considerably suitable for olive production both by geographical location and land structure. Türkiye is among the top 5 producers of olive and olive oil in the world. Production in Türkiye takes place under good agricultural practices. The table presents plant production values.

Table 13. Plant Production Value

YEARS	Plant production value 1,000 TRY	Plant production value per capita (TRY)
1995	1,084,215	
2000	14,920,080	
2005	50,939,687	
2010	80,038,126	805
2014	98,123,089	1,086
2015	120,152,079	1,263
2016	119,237,661	1,526
2017	135,885,136	1,682
2018	159,142,178	1,941
2019	197,455,884	2,375



Source: TURKSTAT (2019)

According to TURKSTAT data, Türkiye's plant production value is higher than its value of animal products and livestock. Plant production is summarized below with selected indicators, based on the Agricultural Structure Research published by TURKSTAT.

- In terms of enterprise groups, 80.7% of agricultural enterprises have land size under 10 hectares, with 25.9% of agricultural enterprises having a size of 2-2.9 hectares. 24.5% of agricultural enterprises have land size of 20-49.9 hectares.

- While cereals and other herbal products are planted in 69.3% of agribusinesses, fruit and other perennial plants, including nursery and greenhouse plant production, beverage and spice plants are grown in 11.9%.
- Around a third of agricultural land is irrigated (31.4%).
- The average agricultural plot size is 1.29 hectares.
- 17.1% of agricultural enterprises cultivate their own land as well as land owned by others.

The 1995-2018 period registered a 213% increase in total plant production. Factors accounting for such increase include increase in production efficiency, certified seed use becoming more widespread, positive improvements in technology level, agricultural support, and producers becoming informed to a certain degree on agricultural techniques. Technical staff and farmer training is organized with the aim of reducing and lingcontrolling disease and harm in plant production, preventing residue and unnecessary and harmful use of pesticides, maintaining the natural balance, and raising awareness on the issue of agricultural sustainability. In this context, technical staff training is undertaken with an organizational planning where theoretical and practical training is delivered by 11 Trainer Institutions (Research Institute Directorates and General Directorate) under 71 programs.

According to the grains and other plant products balance sheet published by TURKSTAT, changes in the indicators selected in the 2007/08-2018/19 period indicate that the production quantity increased by 17%, with a 58.4% increase in fodder use rates. In line with said data, production losses and losses increased by 13.5% and 17.7%, respectively, with a 2% decrease in sufficiency.

Table 14. Grains and Other Plant Products Balance Sheets Based on Selected Indicators

Marketing year	Production (tons)	Cultivation area (hectares)	Production losses (tons)	Consumption (tons)	Seed use (tons)	Fodder use (tons)	Losses (tons)	Consumption per capita (kg)	Sufficiency rate (%)
2018/'19	33,468,699	10,779,036	1,700,259	16,149,885	1,894,371	15,135,129	916,846	196.9	92.4
2017/'18	35,232,767	10,998,473	1,794,264	15,561,538	1,922,389	15,408,473	966,100	192.6	98.0
2016/'17	34,361,164	11,349,212	1,734,879	16,309,043	1,986,290	14,069,985	943,878	204	97.2
2015/'16	37,717,138	11,597,367	1,923,484	15,720,861	2,030,324	13,434,564	1,032,335	199.7	110.2
2014/'15	31,884,157	11,615,643	1,609,067	17,163,839	2,038,840	14,526,528	875,524	220.9	86.4
2013/'14	36,589,268	11,429,730	1,872,603	17,736,739	2,003,909	13,943,050	1,000,519	231.3	98.8
2012/'13	32,497,430	11,173,576	1,677,869	18,716,467	1,964,355	11,132,043	888,098	247.5	93.1
2011/'12	34,302,073	11,804,035	1,789,392	18,562,904	2,085,656	10,564,114	936,022	248.4	99.9
2010/'11	31,912,550	12,001,271	1,654,499	17,249,262	2,123,655	10,046,983	873,667	234.0	98.8
2009/'10	32,827,151	11,970,954	1,706,558	15,871,417	2,117,645	9,132,343	899,308	218.7	109.7
2008/'09	28,533,956	11,890,474	1,468,181	16,684,315	2,101,598	9,252,089	784,135	233.3	92.7
2007/'08	28,608,990	12,309,139	1,498,625	15,733,917	2,199,387	9,557,377	778,985	222.9	94.7
2007/08 -2017/19 Change (%)	17.0	-12.4	13.5	2.6	-13.9	58.4	17.7	-11.7	-2.4

Source: TURKSTAT

Examining Türkiye's vegetable product balance sheet based on the selected indicators reveals that the sufficiency rate in total vegetable production has been above 100% in every marketing year, reaching 106.4% for the 2018/'19 marketing year. In the 2007/08-2018/'19 period, total vegetable production increased by 17.9%, production losses increased by 18.4% relative to the increase in production, consumption increased by 15.31, and losses increased by 42.78%, while consumption per capita decreased by 0.72% and sufficiency rate decreased by 0.2%. In the table, Türkiye's total vegetable production data are presented by years.

Table 15. Türkiye Plant Products Balance Sheet Based on Selected Indicators: Total Plant Production Data

Marketing year	Production (tons)	Production losses (tons)	Consumption (tons)	Losses (tons)	Consumption per capita (kg)	Sufficiency rate (%)
2018/'19	27,984,444	793,051	22,466,518	3,090,994	274.0	106.4
2017/'18	28,572,251	808,073	22,875,669	3,164,258	283.1	106.6
2016/'17	28,037,155	797,354	22,426,889	3,103,332	281	106.7
2015/'16	27,578,234	790,521	22,016,579	3,061,444	279.6	106.8
2014/'15	26,606,476	758,884	21,796,547	2,425,190	280.5	106.7
2013/'14	26,456,335	756,731	21,591,923	2,401,226	281.6	107.1
2012/'13	26,004,917	740,843	21,334,532	2,373,927	282.1	106.6
2011/'12	25,326,886	720,826	20,860,703	2,318,130	279.2	106.2
2010/'11	24,020,259	678,542	19,677,996	2,187,057	266.9	106.8
2009/'10	24,847,679	707,312	20,126,303	2,236,995	277.4	107.9
2008/'09	25,130,131	717,588	20,551,740	2,283,527	287.4	106.9
2007/'08	23,742,082	670,062	19,482,736	2,164,748	276	106.6
2007/'08-2018/'19 Change Rate (%)	17.9	18.4	15.3	42.8	-0.72	0.2

Source: TURKSTAT
**Table doesn't include onion and garlic data.*

Examining the product balance sheets for fruits based on the selected indicators reveals that the self-sufficiency rate for nuts, citrus fruits, and other fruits is over 100%. In line with this data, examining the change rate for 2008/09-2018/19 reveals a 5.53% decrease in production and 41.20% decrease in sufficiency for nuts. Production losses increased by 15.20%, consumption increased by 60.06%, losses increased by 62.43%, and consumption per capita increased by 39.39%. There is an increase for citrus fruits and other fruits in the same period based on the selected indicators.

Table 16. Product Balance Sheets for Fruit Based on Selected Indicators

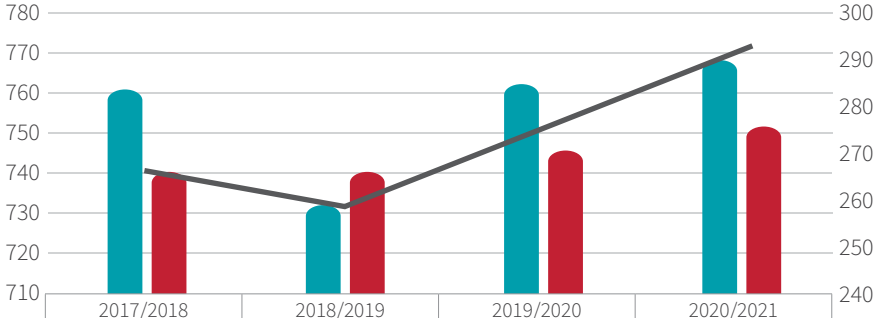
Product	Marketing year	Production (tons)	Production losses (tons)	Consumption (tons)	Losses (tons)	Consumption per capita (kg)	Sufficiency rate (%)
Nuts (Total)	2018/'19	1,133,580	21,537	753,671	22,518	9.2	143.3
	2017/'18	1,115,904	18,585	631,450	17,342	7.8	169.1
	2016/'17	934,750	18,255	641,844	18,858	8.0	138.7
	2015/'16	1,123,750	19,367	598,150	17,418	7.6	179.4
	2014/'15	847,799	15,661	469,323	13,215	6.0	172.5
	2013/'14	992,609	17,460	517,772	14,549	6.8	183.2
	2012/'13	1,151,354	19,600	569,536	16,690	7.5	193.1
	2011/'12	855,348	16,062	534,624	15,458	7.2	152.6
	2010/'11	1,020,711	17,541	490,789	14,224	6.7	198.6
	2009/'10	875,634	15,612	455,132	12,876	6.3	183.8
	2008/'09	1,199,970	18,696	470,878	13,863	6.6	243.7
	2008/'09-2018/'19 Change (%)	-5.53	15.20	60.06	62.43	39.39	-41.20
Citrus Fruits (Total)	2018/'19	4,902,052	110,795	2,695,858	216,165	32.9	172.1
	2017/'18	4,769,726	110,143	2,318,613	183,621	28.7	195.0
	2016/'17	4,293,007	101,386	2,315,981	185,223	29.0	175.7
	2015/'16	3,975,873	96,432	2,304,380	184,987	29.3	163.6
	2014/'15	3,783,517	93,011	2,237,677	179,717	28.8	160.4
	2013/'14	3,681,158	91,927	2,180,394	175,297	28.4	160.2
	2012/'13	3,475,024	86,532	2,296,094	186,008	30.4	143.5
	2011/'12	3,613,766	90,179	2,072,711	165,591	27.7	165.5
	2010/'11	3,572,376	89,158	2,106,038	168,364	28.6	161.0
	2009/'10	3,513,772	87,734	2,152,658	187,843	29.7	146.4
	2008/'09	3,026,936	74,889	1,741,563	152,565	24.4	155.9
	2008/'09-2018/'19 Change (%)	61.95	47.95	54.80	41.69	34.84	10.39
Other Fruits	2018/'19	348,301	,15,496	296,696	,25,800	3.6	103.2
	2017/'18	328,364	14,910	273,185	23,755	3.4	105.6
	2016/'17	261,134	11,482	221,386	19,251	2.8	103.7
	2015/'16	242,155	10,504	205,018	17,828	2.6	104.0
	2014/'15	227,663	9,863	196,930	17,124	2.5	101.8
	2013/'14	270,582	12,103	231,861	20,162	3.0	102.6
	2012/'13	262,263	11,810	219,610	19,097	2.9	104.9
	2011/'12	236,394	10,628	203,980	17,737	2.7	101.8
	2010/'11	224,866	10,048	192,142	16,708	2.6	102.9
	2009/'10	198,760	8,524	171,121	14,880	2.4	102.3
	2008/'09	189,273	8,280	163,604	14,226	2.3	101.8
	2008/'09-2018/'19 Change Rate	84.02	87.15	81.35	81,36	56.52	1.38

Source: TURKSTAT

5.1.1. Wheat

Global wheat production is predicted to reach 773 million tons in the 2020/21 marketing year, with a 1.34% increase from 763 million tons in the 2019/20 marketing year. The increase in wheat production results from the increase in cultivation area and yield.

Upon examining the major exporters in the 2020/2021 marketing year, it is predicted that wheat production will be around 83.3 million tons in Russia, 25.5 million tons in Ukraine, 35.2 million tons in Canada, 135.8 million tons in the EU, 30 million tons in Australia, 17.2 million tons in Argentina, 14.3 million tons in Kazakhstan, and 49.7 million tons in the US. The figure below presents the values for world wheat production and stocks.



	2017/2018	2018/2019	2019/2020	2020/2021
Production (million tons)	762	732	764	768
Consumption (million tons)	742	740	745	753
Stock (million tons)	267	260	278	294

Figure 14. World Wheat Production and Stocks, IGC

According to TURKSTAT data, wheat production, which was 19.5 million tons in 2002, increased to 20.5 million tons in 2020. With the wheat cultivation area decreasing every year due to transitioning to alternative products, production has remained the same thanks to increases in yield. Yield increased from 210 kg/da in 2002 to 296 kg/da in 2020. The figure below presents the wheat consumption and production balance in Türkiye.

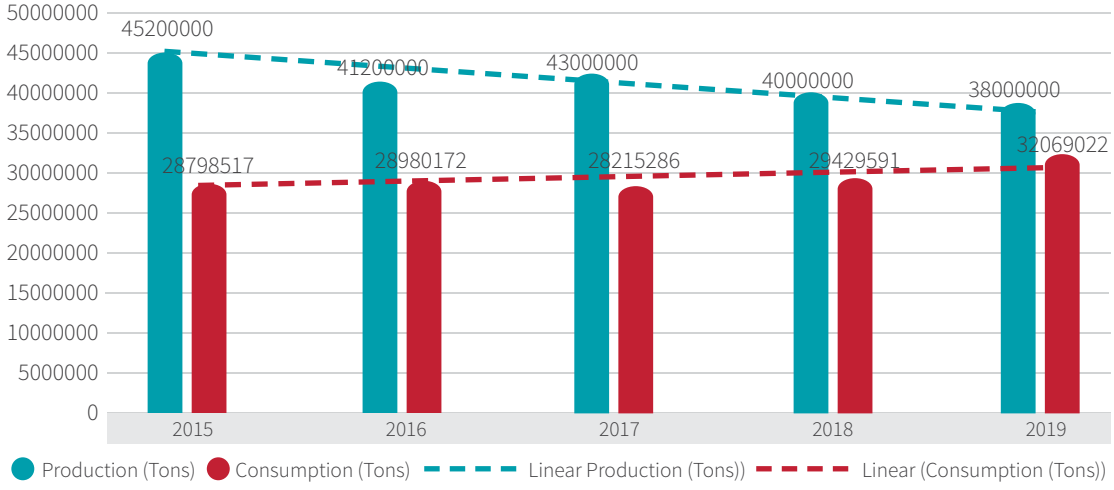


Figure 15. Wheat Balance in Türkiye (million tons)
Source: TURKSTAT

Türkiye's leading provinces in wheat production are Konya (9.92%), Ankara (5.54%), Diyarbakır (5.42%), Tekirdağ (4.51%), Şanlıurfa (3.56%), Mardin (3.28%), Yozgat (2.91%) and Sivas (2.89%), respectively. According to TURKSTAT data, the sufficiency rate for wheat in the 2018/19 marketing year was 100.5%. The following table presents yearly values for cultivation area, production, and yield.

Table 17. 2002-2020 Period Wheat Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	9,300,000	19.5	210
2003	9,100,000	19	209
2011	8,096,000	21.8	269
2012	7,529,639	20.1	267
2013	7,772,600	22.1	284
2014	7,919,208	19	240
2015	7,866,887	22.6	287
2016	7,671,945	20.6	269
2017	7,668,879	21.5	280
2018	7,299,270	20	274
2019	6,846,327	19	278
2020	6,922,236	20.5	296
2002-2020 Change %	-26	5	41

Source: TURKSTAT

5.1.2. Barley

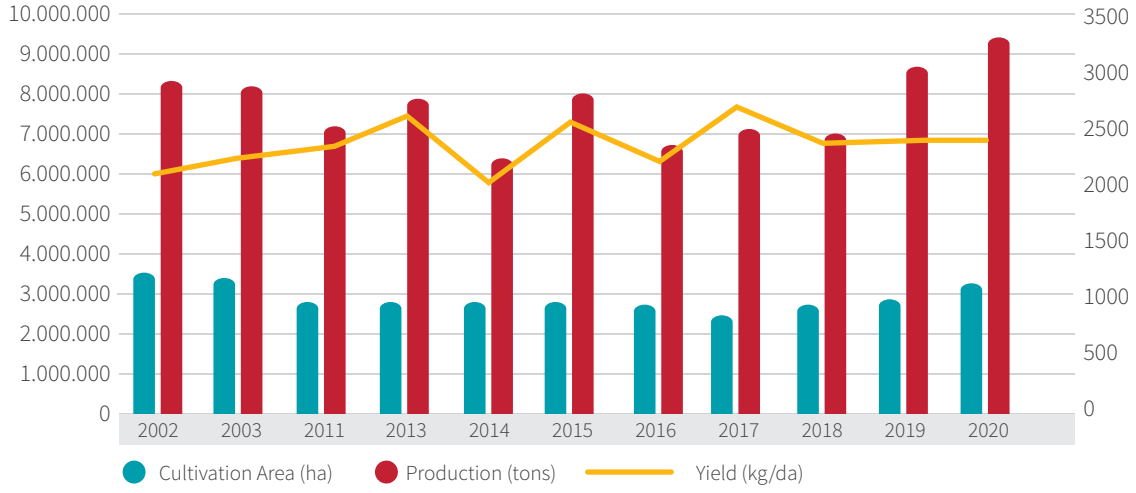
Global barley production is predicted to reach 157 million tons in the 2020/21 marketing year with a 1% increase from last year. Russia's quota and tax applications on barley exports, along with uncertainties in the market, have caused barley prices to be high in world trade. Barley prices are predicted to remain high in 2021 due to the ongoing risks of drought in the world.

According to TURKSTAT data, Türkiye's barley production was 8.3 million tons in 2020. According to 2020 data, Türkiye's barley yield is 268 kg/da, with the leading provinces in barley production being Konya, Ankara, Şanlıurfa, Kırşehir, Kayseri, Sivas, Afyonkarahisar Eskişehir.

Türkiye's Barley Sufficiency rate is 94.7% (TURKSTAT, 2018/2019), with the yearly values for barley cultivation area, production, and yield presented in the following table.

Table 18. 2002-2020 Period Barley Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	3,600,000	8,300,000	2306
2003	3,400,000	8,100,000	2382
2012	2,748,766	7,100,000	2583
2013	2,720,510	7,900,000	2904
2014	2,787,297	6,300,000	2260
2015	2,783,583	8,000,000	2874
2016	2,740,052	6,700,000	2445
2017	2,424,737	7,100,000	2928
2018	2,611,940	7,000,000	2680
2019	2,869,072	7,600,000	2649
2020	3,097,163	8,300,000	2680
2002-2020 Change %	-14	0	16



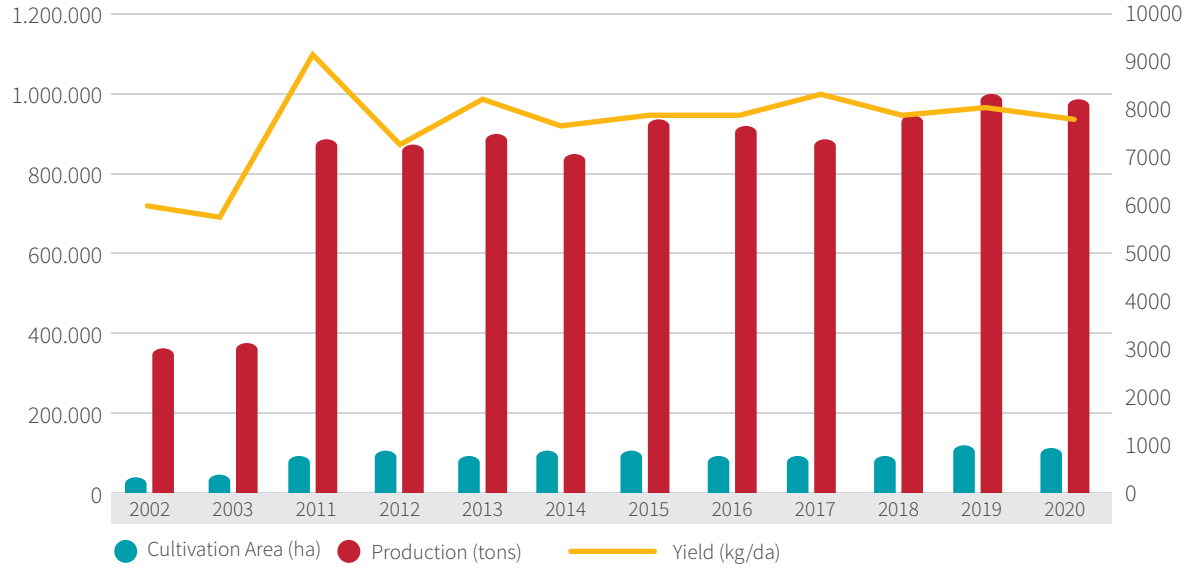
Source: TURKSTAT

5.1.3. Rice

Global rice production was 500 million tons in the 2018/19 marketing year. Rice production is predicted to reach 501 million tons in the 2019/20 marketing year. Türkiye's rice production increased from 360,000 tons in 2002 to 1 million tons in 2019, with 980,000 tons produced in 2020. According to TURKSTAT data, rice yield was 7910 kg/ha in 2019 and 7815 kg/ha in 2020.

Table 19. 2002-2020 Period Rice Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	60,000	360,000	6000
2003	65,000	372,000	5723
2011	99,400	900,000	9054
2012	119,725	880,000	7350
2013	110,592	900,000	8138
2014	110,884	830,000	7485
2015	115,856	920,000	7941
2016	116,056	920,000	7927
2017	109,560	900,000	8215
2018	120,142	940,000	7824
2019	126,419	1,000,000	7910
2020	125.398	980.000	7815
2002-2020 Change %	109	172	30



Source: TURKSTAT

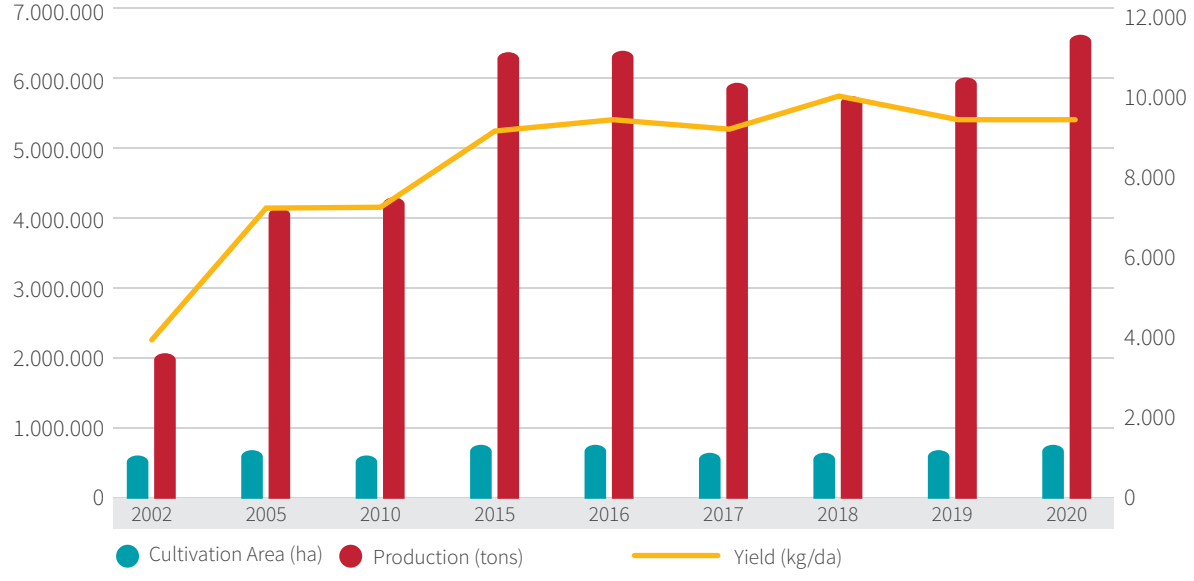
5.1.4. Maize

According to International Grains Council (IGC) data, global maize production is 1.133 billion tons in the 2020/2021 marketing season, with a maize consumption of 1.161 billion tons. It is also predicted that global maize trade will be 183 million tons, with stock quantity being 268 million tons. On the other hand, according to data from the United States Department of Agriculture (USDA), global maize production and consumption in the 2020/2021 marketing year are predicted to reach 1.134 billion tons and 1.144 billion tons, respectively.

According to TURKSTAT data, Türkiye's maize cultivation area was 6.9 million decares in 2015 and 6.4 million decares in 2019. Maize production set a record of 6.5 million tons in 2020 with an 8% increase from 6 million tons in 2019. In the same period, average yield per da increased from 930 kg to 940 kg. Sufficiency rate was 70.3% in the 2018-2019 marketing year.

Table 20. 2002-2020 Period Maize Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	500,000	2,100,000	4.200
2005	600,000	4,200,000	7.000
2010	594,000	4,310,000	7.256
2015	688,170	6,400,000	9.300
2016	680,019	6,400,000	9.412
2017	639,084	5,900,000	9.232
2018	591,900	5,700,000	9.630
2019	638,829	6,000,000	9.392
2020	691,632	6,500,000	9.398
2002-2020 Change %	38	210	124



Source: TURKSTAT

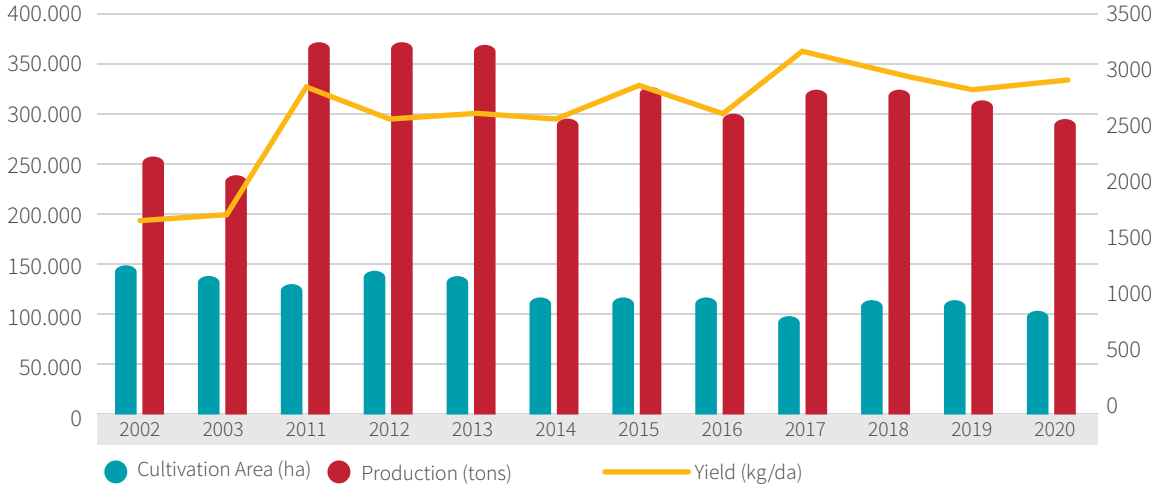
5.1.5. Rye

According to 2019 FAO data, global rye cultivation area is around 4 million ha with a production of 13 million tons. Again, according to TURKSTAT data, the most important rye producers in the World include Germany (3.2 million tons), Poland (2.4 million tons), and Russia (1.4 million tons).

According to TURKSTAT data, Türkiye's rye production was 296,000 tons in 2020, as opposed to 255,000 tons in 2002. Türkiye's rye yield went up to 283 kg/da in 2020 from 170 kg/da in 2002. The following table presents the yearly values for rye cultivation area, production, and yield.

Table 21. 2002-2020 Period Rye Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	150,000	255,000	1700
2003	140,000	240,000	1714
2011	127,653	365,750	2865
2012	143,222	370,000	2583
2013	138,166	365,000	2642
2014	115,080	300,000	2607
2015	112,313	330,000	2938
2016	114,649	300,000	2617
2017	101,092	320,000	3165
2018	110,903	320,000	2885
2019	112,164	310,000	2764
2020	104,365	295,681	2833
2002-2020 Change (%)	-30	16	67



Source: TURKSTAT

Türkiye's leading provinces in rye production are Niğde, Kayseri, Konya, Balıkesir, and Nevşehir. Türkiye's rye sufficiency rate is 100% (TURKSTAT, 2018/2019). Our domestic rye production and consumption are balanced. In Türkiye, rye production is preferred in marginal areas where other agricultural products cannot be cultivated.

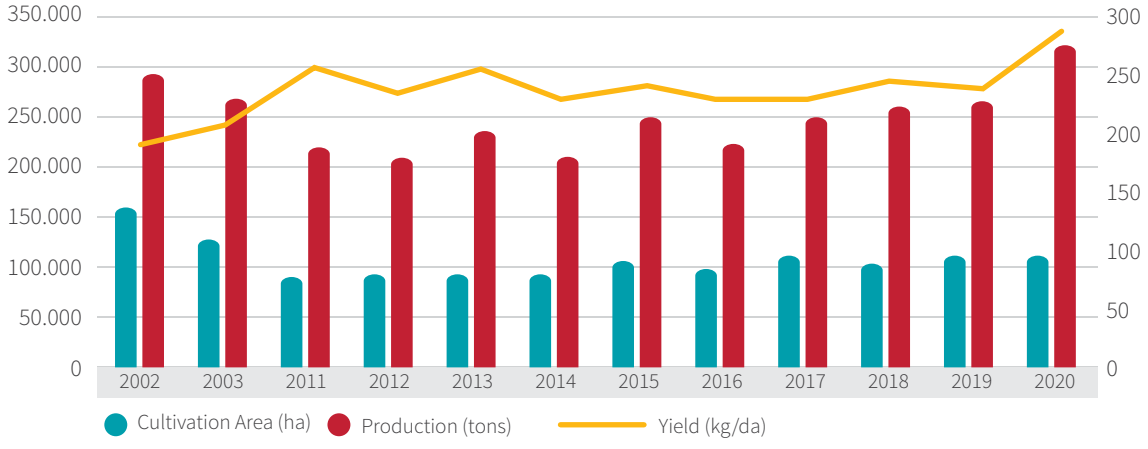
5.1.6. Oat

According to 2019 FAO data, global oat cultivation area is approximately 9 million hectares, with 23 million tons of oat being produced globally.

According to TURKSTAT data, oat yield is 278 kg/da in Türkiye, with 314,000 tons of production. Türkiye's leading provinces in oat production are Ankara, Sivas, Ardahan, and Konya. The sufficiency rate for oats was 99.60% in 2018/19. The following table presents yearly values for oat cultivation area, production, yield, and prices.

Table 22. 2002-2020 Period Oat Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	155,000	290,000	187
2003	130,000	270,000	208
2011	85,863	218,040	254
2012	89,327	210,000	235
2013	92,549	235,000	254
2014	93,862	210,000	224
2015	103,457	250,000	242
2016	99,438	225,000	226
2017	112,880	250,000	221
2018	105,825	260,000	246
2019	109,823	265,000	241
2020	113,263	314,528	278
2002 - 2020 Change (%)	-27	8	49



Source: TURKSTAT

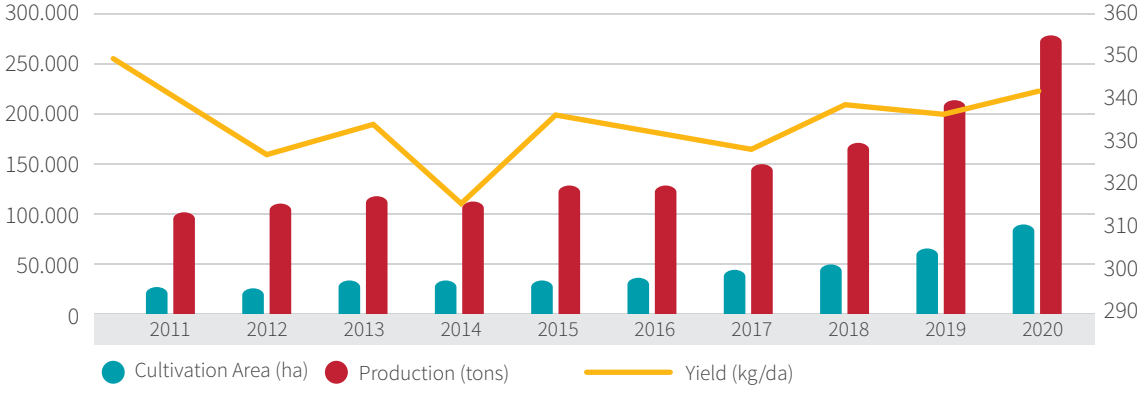
5.1.7. Triticale

According to 2019 FAO data, global triticale cultivation area is around 4 million ha, with a production of 14 million tons. The world's leading countries in triticale production are Poland, Germany, and France.

According to TURKSTAT data, 276.212 tons of triticale were produced in Türkiye in 2020. Türkiye's leading provinces in triticale production are Çorum, Muğla, Sivas, and Denizli. The following table presents the values for Türkiye's triticale cultivation area, production, and yield.

Table 23. 2011-2020 Period Triticale Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2011	29,783	103,797	349
2012	32,227	105,000	326
2013	35,402	118,000	333
2014	34,895	110,000	315
2015	37,206	125,000	336
2016	37,635	125,000	332
2017	45,641	150,000	329
2018	50,283	170,000	338
2019	64,101	215,090	336
2020	81,115	276,212	341



Source: TURKSTAT

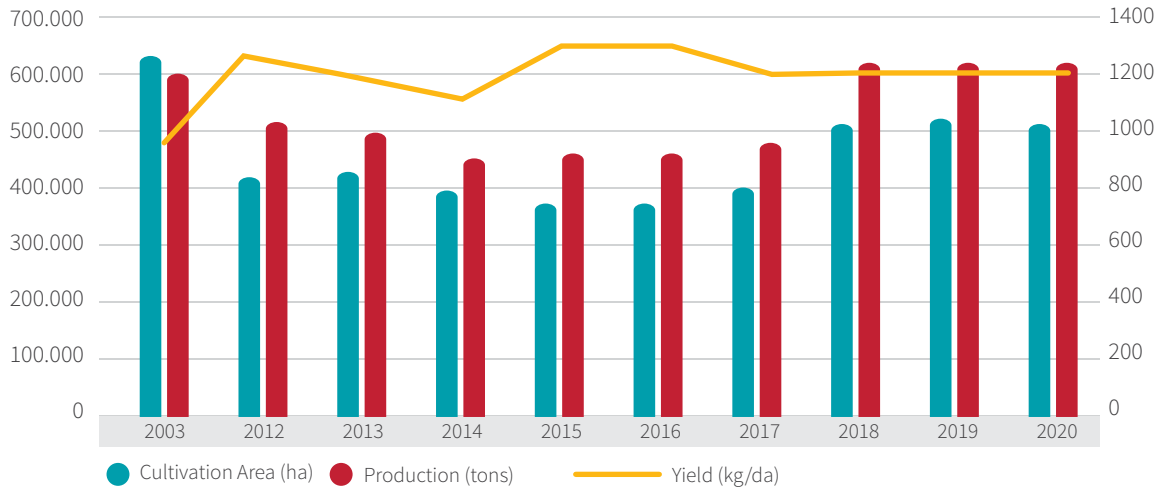
5.1.8. Chickpea

India accounts for 70% of global chickpea production, which was 14 million tons in 2019. India is followed by Pakistan, the USA, Australia, and Türkiye.[59]

According to TURKSTAT data, Türkiye's chickpea production was 630,000 tons in 2020. Chickpea yield was 1,230 kg/ha in 2020, with a self-sufficiency rate of 114% in the 2018/2019 marketing year. Türkiye's leading provinces in chickpea production are Ankara, Yozgat, Kırşehir, Konya, Adıyaman, Kırıkkale, Çorum, and Karaman. The following table presents the values for Türkiye's chickpea cultivation area, production, and yield.

Table 24. 2002-2020 Period Chickpea Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	660,000	650,000	980
2003	630,000	600,000	950
2012	416,241	518,000	1270
2013	423,557	506,000	1190
2014	388,517	450,000	1160
2015	359,304	460,000	1290
2016	359,529	455,000	1290
2017	395,310	470,000	1200
2018	514,416	630,000	1230
2019	520,595	630,000	1.210
2020	511,561	630,000	1.230
2002-2020 Change %	-22.491	-3.077	25.510



Source: TURKSTAT

59 FAOSTAT (http://www.fao.org/faostat/en/#data/)

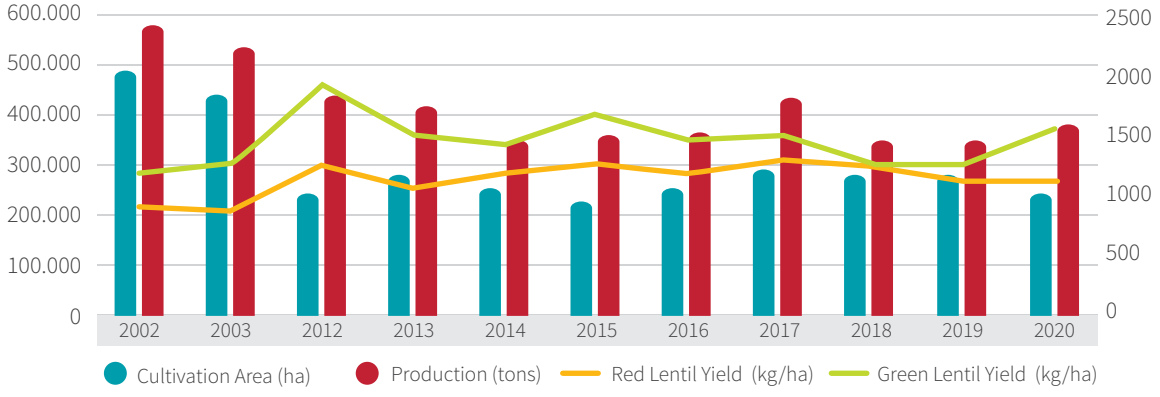
5.1.9. Lentil

Canada accounts for 38% of global lentil production, which was 5.7 million tons in 2019. Canada is followed by India, the USA, and Türkiye.[60]

Türkiye's lentil production, comprising red and green lentils, was 565,000 tons in 2002, while it was 371,000 tons in 2020 (328 thousand tons of red lentil, 42 thousand tons of green lentil). According to TURKSTAT data, Türkiye's red lentil yield was 1.570 kg/ha in 2020, while its green lentil yield was 1,120 kg/ha in 2020. In the 2018/2019 marketing year, Türkiye's red lentil self-sufficiency rate was 75%, while its green lentil self-sufficiency rate was 87%. Türkiye's leading provinces in red lentil production are Şanlıurfa, Diyarbakır, Mardin, Batman, Şırnak and Siirt, while its leading provinces in green lentil production are Yozgat, Konya, Çorum, Kırşehir and Ankara, and Isparta. The following table presents the values for Türkiye's lentil cultivation area, production, and yield.

Table 25. 2002-2020 Period Lentil Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Red Lentil Yield (kg/ha)	Green Lentil Yield (kg/ha)
2002	492,000	565,000	1,190	900
2003	442,000	540,000	1,280	890
2012	237,478	438,000	1,910	1.230
2013	281,178	417,000	1,520	1.060
2014	249,494	345,000	1,400	1.170
2015	223,857	360,000	1,640	1.220
2016	252,236	365,000	1,470	1.190
2017	292,538	430,000	1,490	1.290
2018	277,228	353,000	1,280	1.260
2019	282,388	353,631	1,280	1.100
2020	247,666	370,815	1,570	1.120
2002-2020 Change %	-50	-34	32	24



Source: TURKSTAT

60 Canada-based World Pulses Monitoring Database

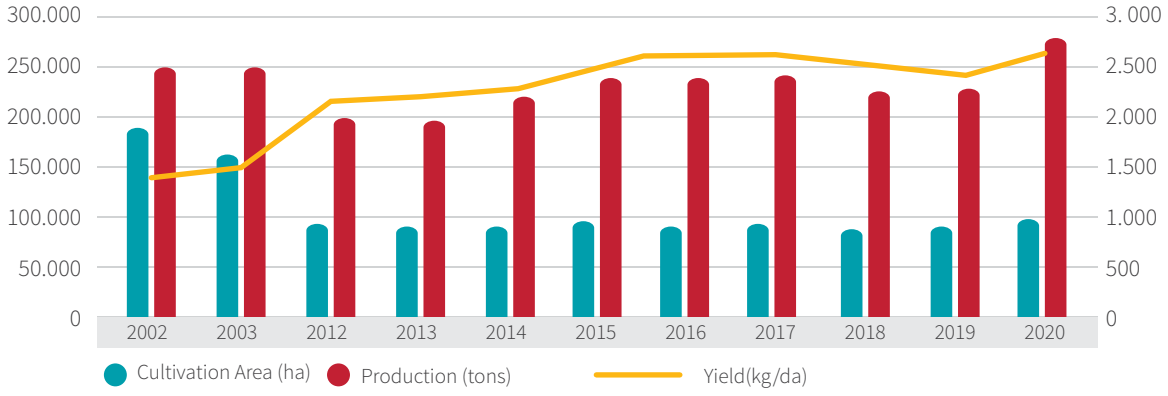
5.1.10. Haricot Bean

Brazil accounts for around 20% of global haricot bean production, which was 29 million tons in 2019. Brazil is followed by Myanmar, the USA, Mexico, and China.[61]

According to TURKSTAT data, Türkiye's haricot bean production in 2020 was 280,000 tons. Türkiye's leading provinces in haricot bean production are Konya, Niğde, Bitlis, Nevşehir, and Karaman. Türkiye's haricot bean self-sufficiency rate was 72% in the 2018/2019 marketing year. The following table presents the values for Türkiye's haricot bean cultivation area, production, and yield.

Table 26. 2002-2020 Period Haricot Bean Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	180,000	250,000	1,390
2003	162,000	250,000	1,540
2012	93,174	200,000	2,150
2013	84,763	195,000	2,300
2014	91,110	215,000	2,360
2015	93,584	235,000	2,510
2016	89,820	235,000	2,620
2017	89,722	239,000	2,660
2018	84,805	220,000	2,590
2019	88,939	225,000	2,530
2020	102,986	279,518	2,710
2002-2020 Change %	-43	12	94



Source: TURKSTAT

61 Canada-based World Pulses Monitoring Database

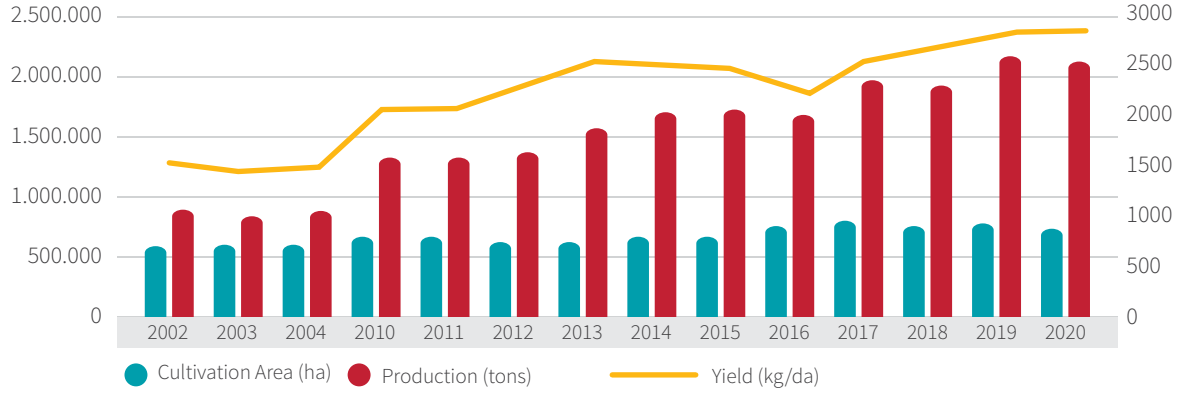
5.1.11. Sunflower

According to FAO (2019) data[62], global sunflower production is 56 million tons, with Russia (15.4 million tons), Ukraine (15.3 million tons), Argentina (3.8 million tons), Romania (3.5 million tons), China (2.4 million tons), Türkiye (2.1 million tons), and Bulgaria (1.9 million tons) being the leading producers in the world. The average global sunflower yield is 2.049 kg/ha whereas it is 2,920 kg/ha in Türkiye.

According to 2020 TURKSTAT data[63], Türkiye's sunflower production in 2020 was 2 million tons (1.9 million tons for oil, 167,000 tons for snacks), up from 850,000 tons in 2002. Türkiye's leading provinces in sunflower production are Tekirdağ, Konya, Edirne, Kırklareli, Adana, and Çorum. Türkiye's sunflower self-sufficiency rate is 66.4%. The following table includes the values for Türkiye's sunflower cultivation area, production, and yield.

Table 27. 2002-2020 Period Sunflower Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	550,000	850,000	1550
2003	545,000	800,000	1470
2004	550,000	900,000	1640
2010	641,400	1,320,000	2060
2011	655,700	1,335,000	2040
2012	604,616	1,370,000	2270
2013	609,784	1,523,000	2500
2014	657,458	1,637,900	2490
2015	685,317	1,680,700	2450
2016	720,108	1,670,716	2320
2017	779,622	1,964,385	2520
2018	734,465	1,949,229	2650
2019	752,632	2,100,000	2790
2020	728,853	2,067,004	2840
2002-2020 Change %	33	143	83



Source: TURKSTAT

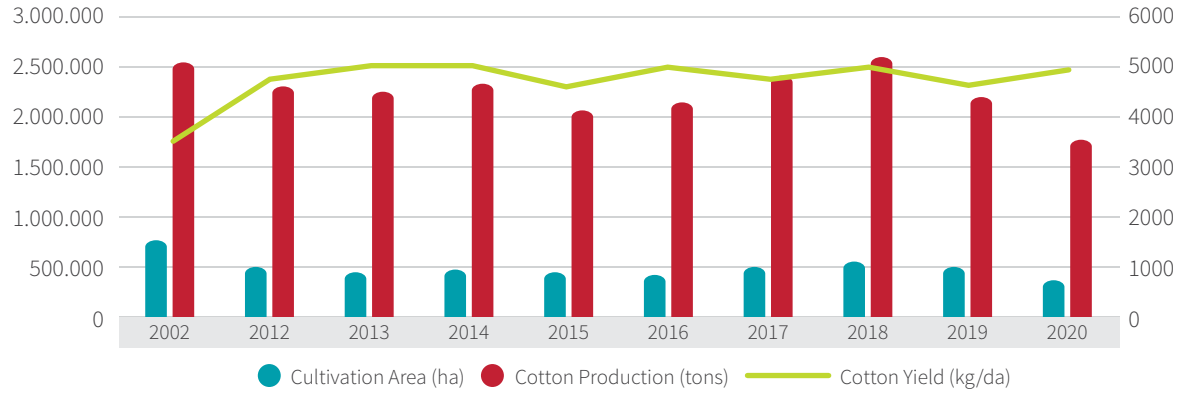
62 http://www.fao.org/faostat/en/#data/QC
63 http://www.tuik.gov.tr/UstMenu.do?metod=kategorist

5.1.12. Cotton

It is predicted that 24.8 million tons of fibre cotton were produced on an area of 32.3 million ha in the 2020/2021 production season, with consumption predicted to reach 25.5 million tons. India, China, the USA, Brazil, Pakistan, and Uzbekistan accounted for 80% of cotton fibre production in the 2020/2021 production season. Türkiye ranked 7th in cotton fibre production in the 2020/2021 production season. According to TURKSTAT data, Türkiye's average cotton (unseeded) production in the last 15 years was 2.2 million tons. Türkiye's cotton unseeded yield was 4940 kg/ha in the 2020/2021 production season with a cottonseed self-sufficiency rate of 104.3% in 2018. Şanlıurfa, Aydın, Diyarbakır, Hatay, İzmir, and Adana, accounted for 85% of Türkiye's cotton production in the 2020/2021 production season. The following table presents the values for Türkiye's cotton (unseeded) cultivation area, production, and yield.

Table 28. 2002-2020 Period Cotton Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Unseeded Production (tons)	Unseeded Yield (kg/ha)
2002	721,077	2,541,832	3530
2012	488,496	2,320,000	4750
2013	450,890	2,250,000	4990
2014	468,143	2,350,000	5020
2015	434,013	2,050,000	4720
2016	416,010	2,100,000	5050
2017	501,853	2,450,000	4880
2018	518,634	2,570,000	4960
2019	477,868	2,200,000	4600
2020	359,220	1,773,646	4940
2002-2020 Change %	-50	-30	40



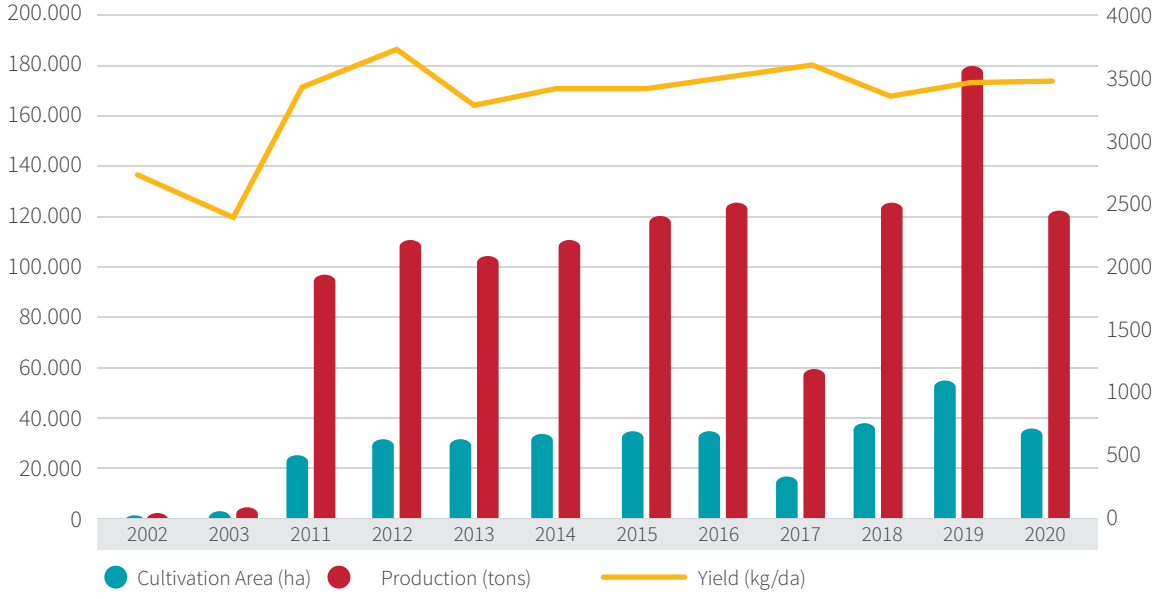
Source: TURKSTAT, USDA

5.1.13. Rapeseed

According to FAO (2019) data, global rapeseed production is 70.5 million tons. Canada, China, India, France, and Ukraine are among the world's leading rapeseed producers. According to TURKSTAT data, Türkiye's rapeseed production was 121,500 tons in 2020, up from 1,500 tons in 2002. Türkiye's rapeseed yield was 3470 kg/ha in 2020. Türkiye's leading provinces in rapeseed production are Tekirdağ, Edirne, Konya, Kırklareli, and İstanbul. Türkiye's rapeseed self-sufficiency rate is 132.9%. The following table presents the values for Türkiye's rapeseed cultivation area, production, and yield.

Table 29. 2002-2020 Period Rapeseed Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	550	1.500	2730
2003	2,800	6,500	2320
2011	26,829	91,239	3400
2012	29,542	110,000	3720
2013	31,127	102,000	3280
2014	32,133	110,000	3420
2015	35,082	120,000	3420
2016	35,453	125,000	3530
2017	16,520	60,000	3630
2018	37,846	125,000	3300
2019	52,514	180,000	3430
2020	34,989	121,542	3470
2002-2020 Change %	6.262	8.003	27



Source: TURKSTAT

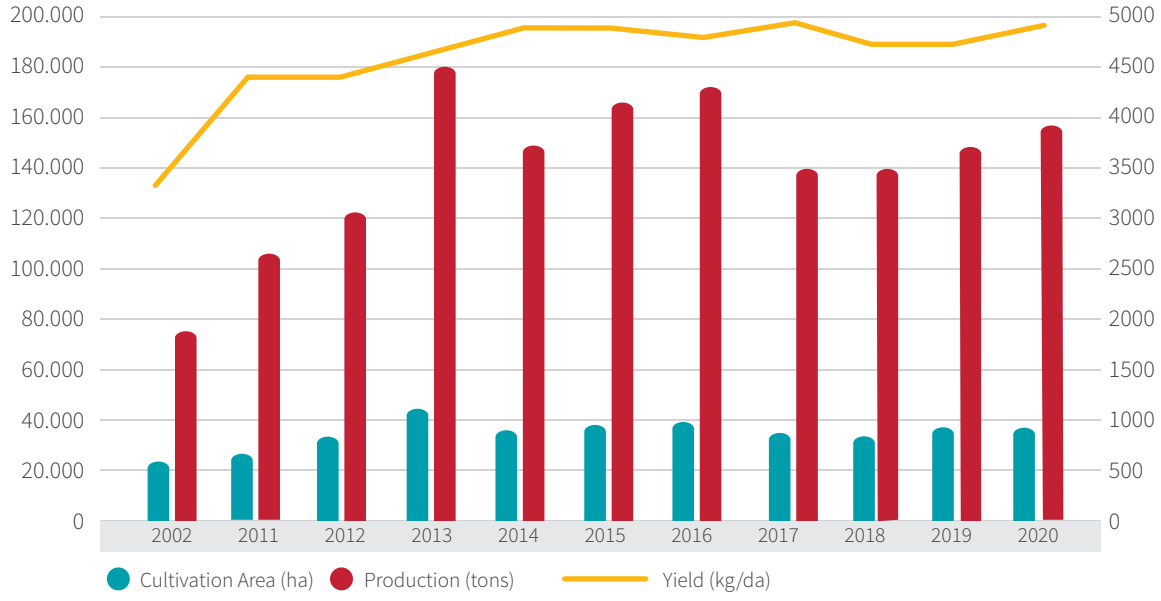
5.1.14. Soybean

According to FAO (2019) data, global soybean production is 334 million tons. Brazil, the USA, Argentina, China, India, Paraguay, Canada, and Russia are among the world's leading soybean producers.

According to TURKSTAT data, Türkiye's soybean production was 155,000 tons in 2020, up from 75,000 tons in 2002. Türkiye's leading provinces in soybean production are Adana, Mersin, Osmaniye, Samsun, and Kahramanmaraş. Türkiye's soybean self-sufficiency rate is 5.7%. Maize, cotton, and rice cultivation being more advantageous in areas that are suitable for soybean production is a limiting factor for soybean production. The following table presents the values for Türkiye's soybean cultivation area, production, and yield.

Table 30. 2002-2020 Period Soybean Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	25,500	75,000	2,940
2011	26,421	102,260	3,870
2012	31,599	122,114	3,860
2013	43,260	180,000	4,160
2014	34,318	150,000	4,370
2015	36,732	161,000	4,380
2016	38,180	165,000	4,320
2017	31,670	140,000	4,420
2018	32,848	140,000	4,260
2019	35,295	150,000	4,250
2020	35,134	155,225	4,420
2002-2020 Change %	38	107	50



Source: TURKSTAT

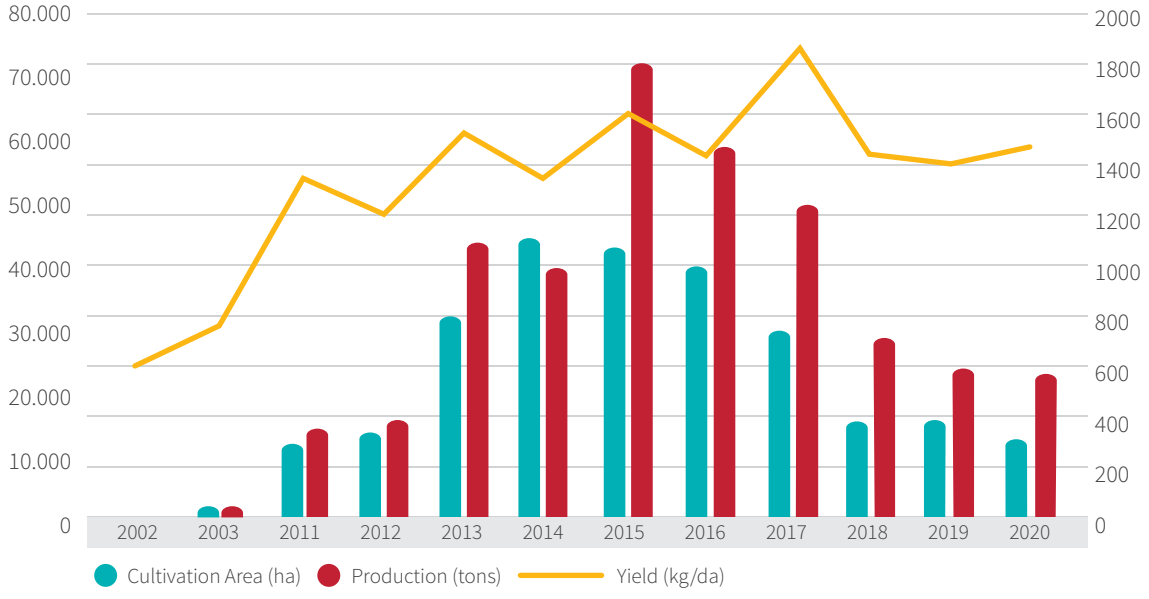
5.1.15. Safflower

According to FAO (2019) data, global safflower production is 591,000 tons. Kazakhstan, the USA, Russia, the USA, Mexico, China, Türkiye, and India are among the world's leading safflower producers.

According to TURKSTAT data, Türkiye's safflower production was 21,000 tons in 2020. Türkiye's safflower yield was 1410 kg/ha in 2020. The following table presents the yearly values for Türkiye's safflower cultivation area, production, and yield.

Table 31. 2002-2020 Period Hazelnut Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	40	25	625
2003	250	170	680
2011	13,167	18,228	1,384
2012	15,592	19,945	1,279
2013	29,292	45,000	1,536
2014	44,305	62,000	1,399
2015	43,107	70,000	1,624
2016	39,571	58,000	1,466
2017	27,376	50,000	1,826
2018	24,693	35,000	1,417
2019	15,860	21,883	1,380
2020	15,115	21,325	1,410
2002-2020 Change (%)	37.688	85.200	126



Source: TURKSTAT

5.1.16. Apricot

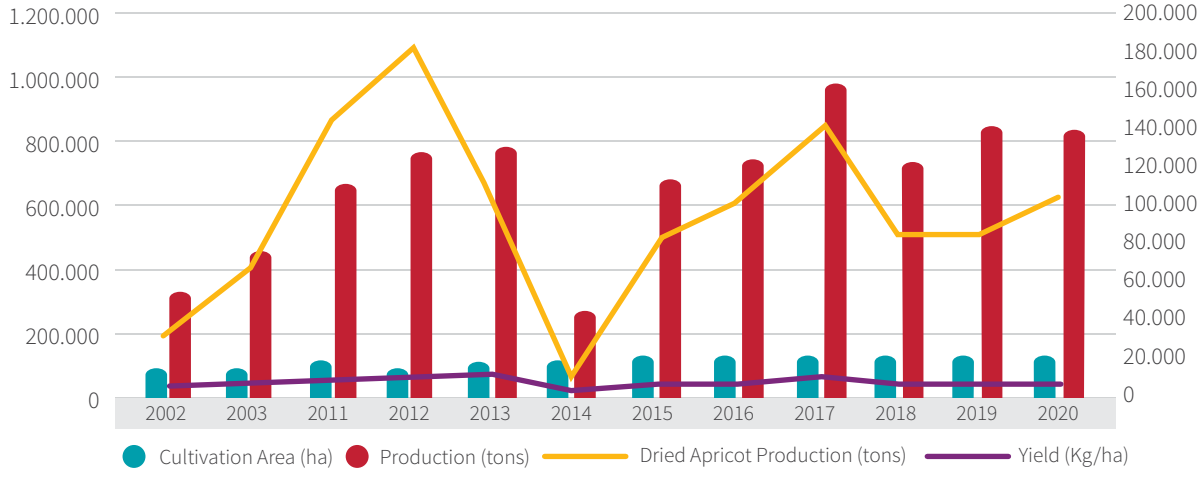
According to FAO (2017) data, global apricot production is 4.1 million tons. Türkiye, Uzbekistan, Iran, Italy, and Algeria are among the world's leading apricot producers.

Türkiye is the leading apricot producer in the world. According to TURKSTAT data, apricot production was 833,000 tons in 2020. Türkiye's apricot yield was 6280 kg/ha in 2020, up from 3520 kg/ha in 2002. Türkiye's leading provinces in apricot production are Malatya, Mersin, Kahramanmaraş, Elazığ, and Iğdır. Türkiye's apricot sufficiency rate is 350%, with a consumption per capita of 2.4 kg. 40-45% of apricot is consumed fresh in Türkiye. Dried apricot is exported mainly to the USA, France, Germany, the UK, and Russia.

The following table presents the values for Türkiye's apricot cultivation area, production, and yield.

Table 32. 2002-2020 Period Apricot Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	*Dried Apricot Production (tons)	Yield (kg/ha)
2002	89,500	315,000	31,250	3520
2003	90,000	460,000	71,000	5111
2011	112,079	650,000	136,917	5799
2012	114,051	760,000	176,718	6664
2013	115,613	780,000	110,345	6747
2014	116,918	270,000	8,210	2309
2015	122,160	680,000	84,500	5566
2016	123,805	730,000	103,250	5896
2017	125,048	985,000	142,260	7877
2018	125,756	750,000	89,318	5964
2019	131,178	846,606	88,392	6454
2020	132,748	833,398	104,254	6278
2002-2020 Change (%)	48	165	233	78



*Source: TURKSTAT, *January-November Period*

5.1.17. Grape

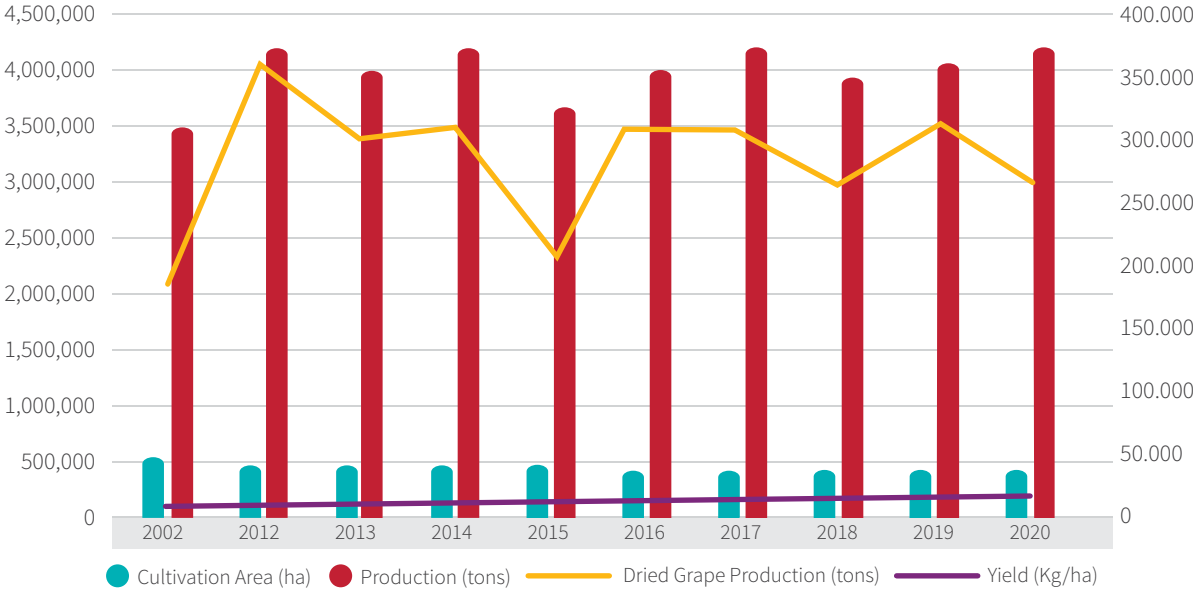
According to FAO (2019) data, global grape production is 77 million tons. China, Italy, the USA, Spain, and France are the leading grape producers of the world. Türkiye ranks 6th in the world with 4.1 million tons of production. As of 2019, said 4.1 million tons of grape consists of:

- 2.1 million tons of table grape (edible) (51%),
- 1.6 million tons for drying (39%),
- 451,000 tons of other (11%) grape.

Türkiye's grape yield was 10,113 kg/ha in 2019. The following table includes the values for Türkiye's grape cultivation area, production, and yield.

Table 33. 2002-2020 Period Grape Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	*Dried Grape Production (tons)	Yield (kg/ha)
2002	530,000	3,500,000	190,000	6,604
2012	462,296	4,185,126	359,000	9,154
2013	468,792	4,011,409	299,000	8,557
2014	467,093	4,175,356	310,000	8,939
2015	461,956	3,650,000	200,000	7,901
2016	435,227	4,000,000	313,000	9,191
2017	416,907	4,200,000	310,000	10,074
2018	417,041	3,933,000	262,000	9,431
2019	405,439	4,100,000	307,500	10,113
2020	400,998	4,208,908	271,000	10,496
2002-2020 Change (%)	-24	20	42	59



Source: TURKSTAT.

**Change includes the years 2002-2020. There is a surplus of seedless dry grape.*

5.1.18. Olive

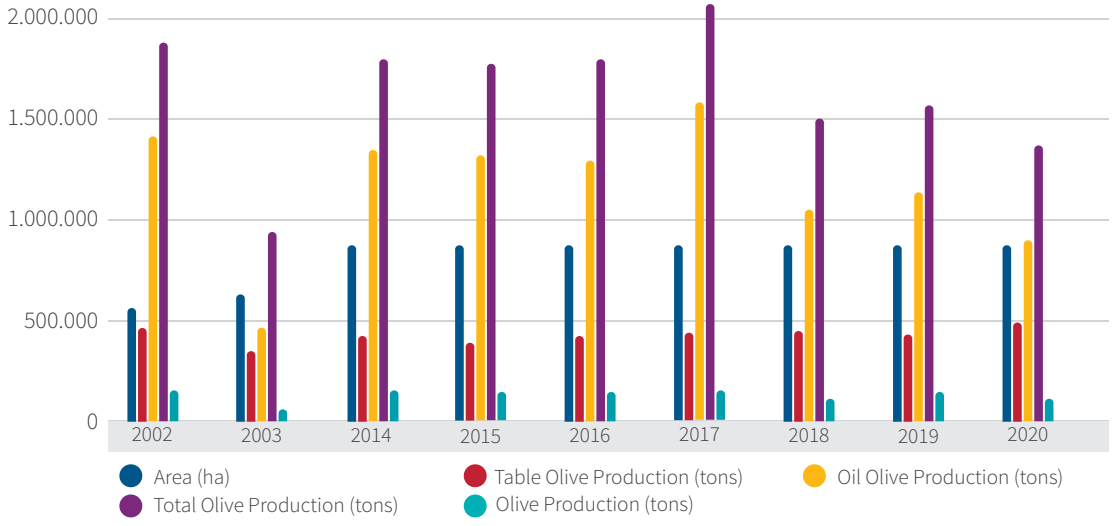
According to FAO (2019) data, global olive production is 19.5 million tons. The world's leading olive producers are Spain, Italy, Morocco, and Türkiye, with Türkiye ranking 4th with a production of 1,525,000 tons. The world's leading olive oil producers are Spain, Italy, Portugal, Tunisia, and Greece, with Türkiye ranking 7th with 225,000 tons of olive oil production.

According to TURKSTAT data, Türkiye's total olive production was 1,317,000 tons (513,000 tons edible, 803,000 tons for oil) in 2020. Türkiye's olive yield was 9 kg/tree in the 2019/2020 marketing year.

According to TURKSTAT (2020) data, Türkiye's leading provinces in edible olive production are Manisa, Bursa, Aydın, Mersin, Osmaniye, Balıkesir, Hatay, Antalya, and İzmir. Its leading provinces in olive for oil production are Manisa, Balıkesir, İzmir, Aydın, Gaziantep, Hatay, and Muğla. The following table presents the values for olive and olive oil in Türkiye.

Table 34. 2002-2020 Period Olive Cultivation Area, Production, and Yield Values

Years	Area	Olive Production (tons)			Olive Oil Production
	(Ha)	Edible	Oil	Total	(tons)
2002	620,000	450,000	1,350,000	1,800,000	140,000
2003	625,000	350,000	500,000	850,000	79,000
2014	826,092	438,000	1,330,000	1,768,000	190,000
2015	836,935	400,000	1,300,000	1,700,000	185,000
2016	845,542	430,000	1,300,000	1,730,000	195,000
2017	846,062	460,000	1,640,000	2,100,000	275,000
2018	864,428	426,995	1,073,472	1,500,467	193,000
2019	879,177	415,000	1,110,000	1,525,000	225,000
2020	887,077	513,140	803,486	1,316,626	172,813
2002-2020 Change (%)	43	14	-40	-26	23



*Source: TURKSTAT, BÜGEM, * Change includes the years 2002-2020.*

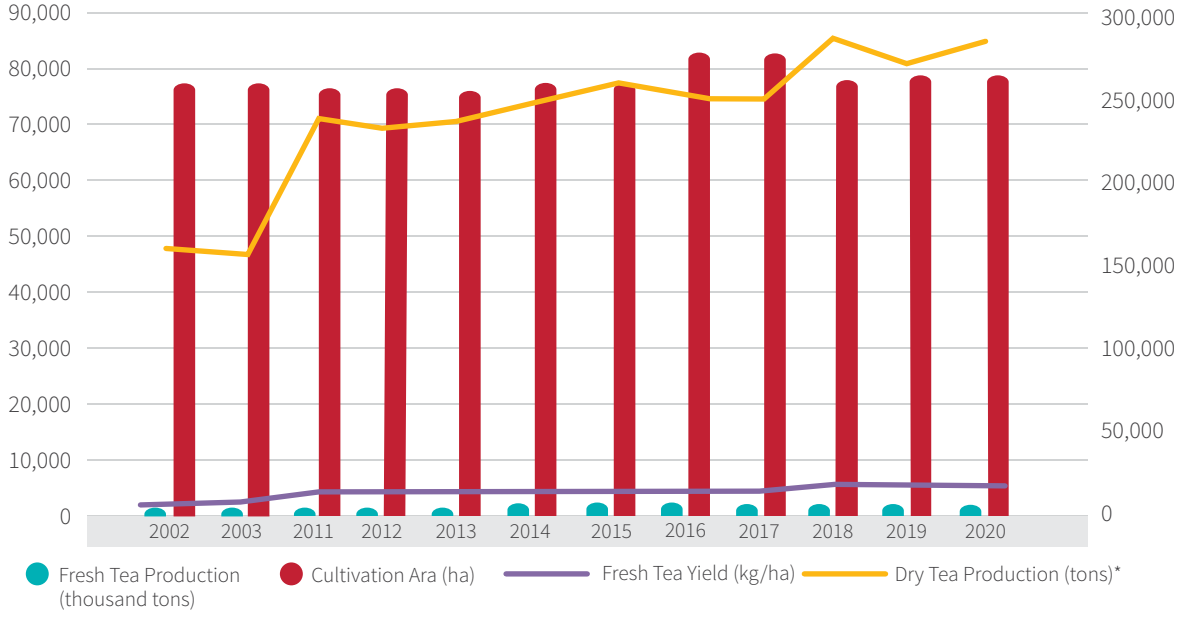
5.1.19. Tea

According to 2019 FAO data, global processed tea production is 6,497,000 tons. According to 2019 data, China accounts for 43% of global processed tea production, with India accounting for 21%, Kenya accounting for 7%, Sri Lanka accounting for 5%, and Vietnam and Türkiye accounting for 4% each.

Türkiye's tea production was 1,451,000 tons in 2020. Türkiye's tea yield was 18.436 kg/ha in 2020. Türkiye's provinces where tea is produced are Rize, Artvin, Trabzon, and Giresun. Türkiye's tea sufficiency rate is 96.8%, with a fresh tea consumption per capita of 17 kg (processed tea consumption of 3-3.5 kg). The following table presents the values for tea in Türkiye.

Table 35. 2002-2020 Period Tea Cultivation Area, Production, and Yield Values

Years	Cultivation Area (Hectares)	Yaş Çay Üretimi (Bin ton)	Yaş Çay Verimi (kg/ha)	Kuru Çay Üretimi (Ton)*
2002	76,645	792	10,333	165,890
2003	76,640	875	11,420	163,102
2011	75,884	1,234	16,260	232,989
2012	75,895	1,149	15,139	223,128
2013	75,910	1,176	15,494	231,501
2014	75,915	1,266	16,681	246,121
2015	76,241	1,328	17,418	259,679
2016	82,950	1,296	15,620	255,690
2017	83,490	1,273	15,244	248,736
2018	78,133	1,481	18,949	286,150
2019	78,569	1,407	17,914	268,902
2020	78,681	1,451	18,436	281,640
2002-2020 Change %	2.66	83.21	78.42	69.78



Source: ÇAYKUR

**Processed Tea Production was estimated based on the tea purchases of the private sector and added to ÇAYKUR's processed tea production..*

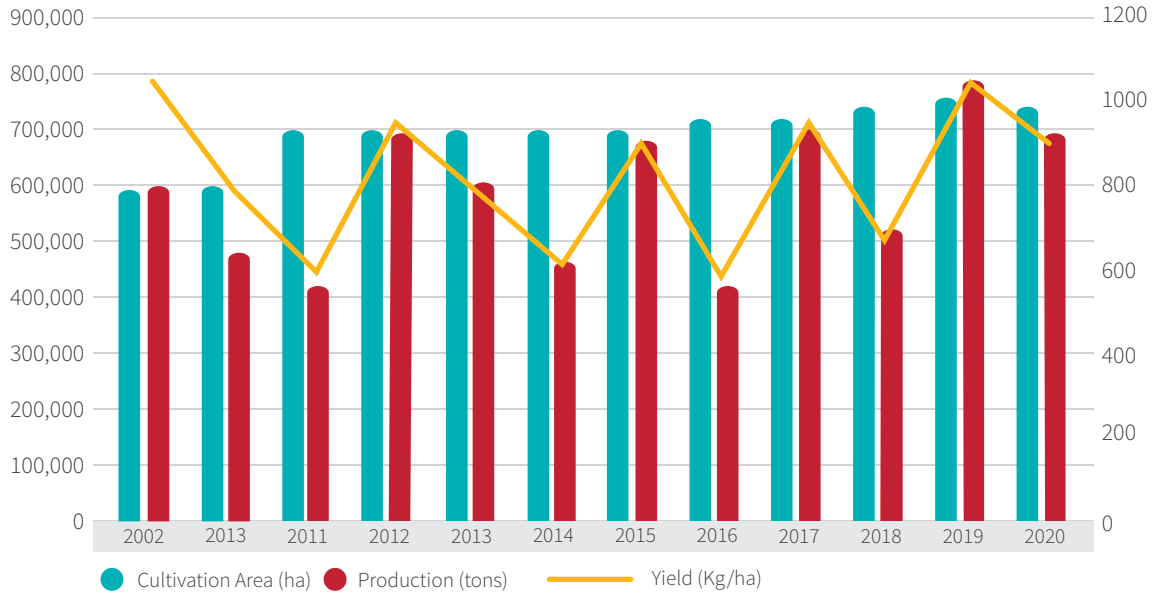
5.1.20. Hazelnut

According to FAO (2019) data, global hazelnut production is 1,125,000 tons on 1 million ha of land. The world's prominent hazelnut producers are Türkiye, Italy, the USA, Azerbaijan, Georgia, France, Iran, China, and Chile. Türkiye ranks first in global hazelnut production and exports.

According to TURKSTAT data, Türkiye's hazelnut production varied between 665,000 tons and 775,000 tons in the last five-year period. According to TURKSTAT (2020) data, Türkiye's leading provinces in hazelnut production are Ordu, Samsun, Giresun, Sakarya, Düzce, and Trabzon. In Türkiye, in 2018/2019 period, hazelnut sufficiency level is 445% and per capita consumption is 1.4 kg. The following table presents the values for Türkiye's hazelnut cultivation area, production, and yield.

Table 36. 2002-2020 Period Hazelnut Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	560,000	600,000	1071
2003	600,000	480,000	800
2011	696,964	430,000	617
2012	701,407	660,000	941
2013	702,144	549,000	782
2014	701,141	450,000	642
2015	702,628	646,000	919
2016	705,445	420,000	595
2017	706,667	675,000	955
2018	728,381	515,000	707
2019	734,409	776,046	1057
2020	734,725	665,000	905
2002-2020 Change %	31	11	-16



Source: TURKSTAT

** Change includes the years 2002-2020.*

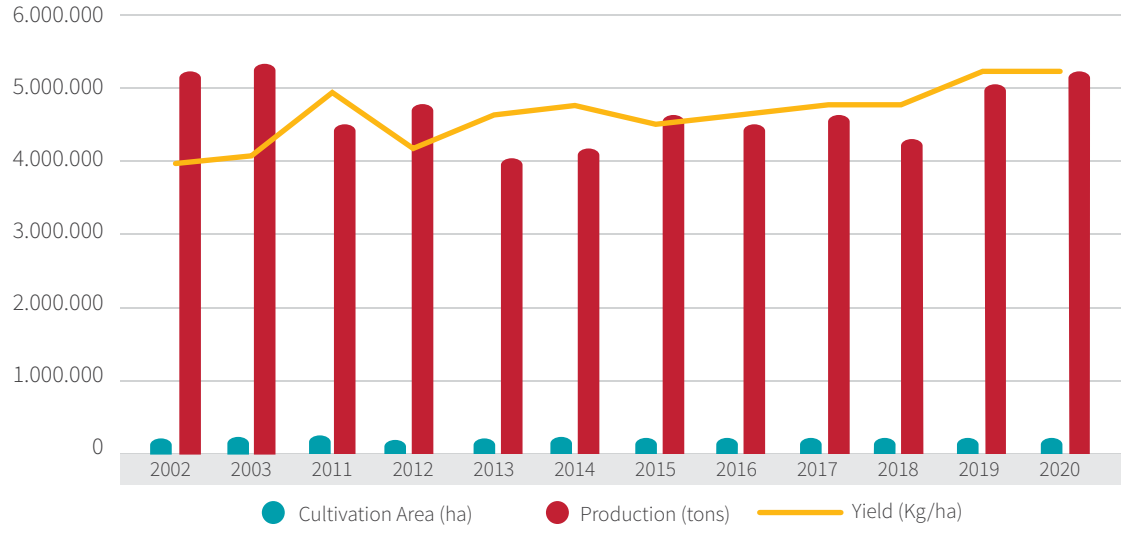
5.1.21. Potato

According to FAO data, global potato production was 370.4 million tons in 2019. The world's major potato producers are China, India, Russia, Ukraine, the USA, and Germany.

According to TURKSTAT data, Türkiye's potato production in 2020 was 5.2 million tons, with a yield of 3,514 kg/da. Türkiye's leading provinces in potato production are Niğde, Konya, Afyon, Kayseri, İzmir, Nevşehir, Aksaray, Adana, Bitlis, Sivas, and Bolu. Türkiye's potato consumption per capita is 47.1 kg, with a potato sufficiency rate of 103.3%. The following table includes the values for potato production in Türkiye.

Tablo 37. 2002-2020 Dönemi Patates Ekim Alanı, Üretim ve Verim Değerleri

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	198,000	5,200,000	26,300
2003	195,000	5,300,000	27,260
2011	142,985	4,613,071	32,600
2012	172,087	4,795,122	28,140
2013	125,030	3,948,000	31,600
2014	129,703	4,166,000	32,450
2015	153,879	4,760,000	30,950
2016	144,857	4,750,000	32,830
2017	142,884	4,800,000	33,600
2018	135,937	4,550,000	33,480
2019	140,896	4,979,824	35,380
2020	147,993	5,200,000	35,140
2002-2020 Change %	-25	0	34



Source: TURKSTAT

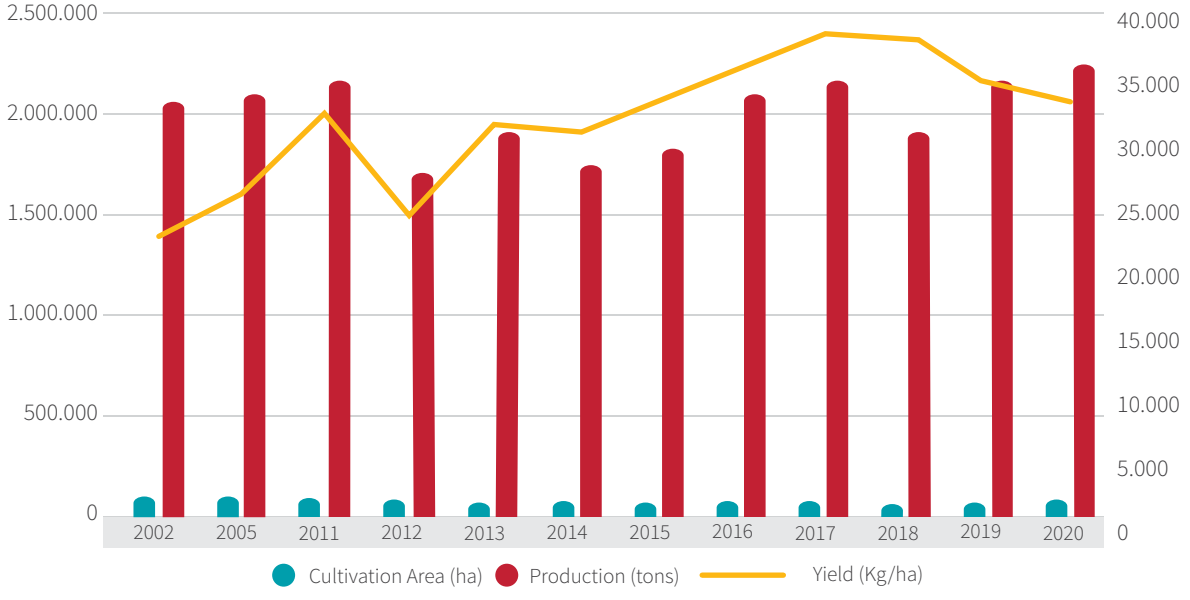
5.1.22. Onion

According to FAO data, global onion production was 100 million tons in 2019. The world's major onion producers are China, India, the USA, Egypt, and Türkiye.

According to TURKSTAT data, Türkiye's onion production in 2020 was 2.3 million tons, with a yield of 33.290 kg/ha. Türkiye's leading provinces in onion production are Ankara, Amasya, Hatay, Adana, and Eskişehir. Türkiye's onion sufficiency rate is 97.4%, with a consumption per capita of 21.7 kg. The following table presents the values for onion production in Türkiye.

Table 38. 2002-2020 Period Onion Cultivation Area, Production, and Yield Values

Years	Cultivation Area (ha)	Production (tons)	Yield (kg/ha)
2002	90,000	2,050,000	22,780
2005	77,280	2,070,000	26,790
2011	66,119	2,141,373	32,390
2012	72,232	1,735,857	24,030
2013	61,632	1,904,846	30,910
2014	60,044	1,790,000	29,810
2015	57,704	1,879,189	32,570
2016	60,402	2,120,581	35,110
2017	57,692	2,175,911	37,720
2018	52,713	1,930,695	36,630
2019	61,359	2,200,000	35,850
2020	68,491	2,280,000	33,290
2002-2020 Change %	-24	10	46



Source: TURKSTAT
**Change includes the years 2002-2020.*

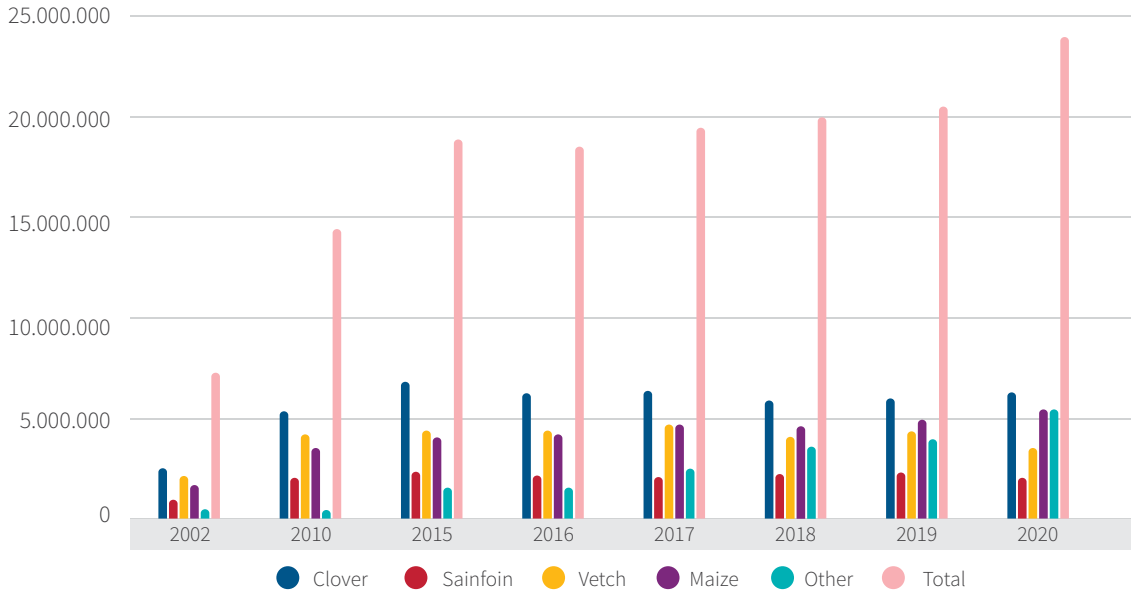
5.1.23. Fodder Crops

Fodder crop production is connected to animal production, being especially important for animal health and reducing the costs of animal products. According to FAO (2017) data, the world's leading fodder crop producers are the USA, Hungary, Romania, Spain, Italy, England, Germany, and France.

According to TURKSTAT data, Türkiye's fodder crop cultivation area increased by 144% after 2000, reaching 2.69 million hectares in 2017. The rate of fodder crop cultivated areas increased to 13.5% in a total of 20 million hectares of arable land. The following table presents the values for Türkiye's fodder crop cultivation area and fodder crop data.

Table 39. Fodder Crop Total Cultivation Area (da)

Years	Clover	Sainfoin	Vetch	Maize	Other	Total
2002	2,600,000	,990,000	2,350,000	2,000,000	33,000	7,973,000
2010	5,688,107	1,570,810	4,288,400	2,937,336	129,888	14,614,541
2015	6,620,459	1,914,036	4,365,182	4,231,233	1,496,667	18,627,577
2016	6,501,107	1,936,940	4,428,378	4,257,753	1,547,844	18,672,022
2017	6,594,319	1,961,808	4,456,256	4,477,354	2,056,232	19,545,969
2018	6,351,052	1,817,338	3,869,465	4,726,428	3,228,317	19,992,600
2019	6,412,128	1,752,763	3,914,980	5,074,127	3,819,814	20,973,812
2020	6,628,887	1,744,949	3,759,436	5,262,613	5,290,759	22,686,644
2002-2020 Change (%)	155	76	60	163	15933	185



Source: TURKSTAT

5.1.24. Sugar Market

5.1.24.1. World Sugar Market

As of the 2019/20 marketing year, 76% of sugar is produced from sugar cane, with the remaining 24% being produced from beet. World sugar market prices are determined by the low-cost sugar cane, which dominates trade. There is no quality difference between sugar produced from cane and beet. But sugar produced from cane has lower costs than sugar produced from beet, due to sugar cane, which can only be cultivated in tropical subtropical regions, having lower production and processing costs compared to beet. The world's major sugar producers from beet are European Union countries, Russia, Ukraine, and Türkiye, and major sugar producers from cane are Brazil, India, Mexico, Thailand, and Australia, with the major countries that produce sugar from both sugar beet and sugar cane being the USA, Japan, and China.

Data on the production of the 13 largest sugar producers of the world sugar market in the last 4 marketing years is presented in the graph below.

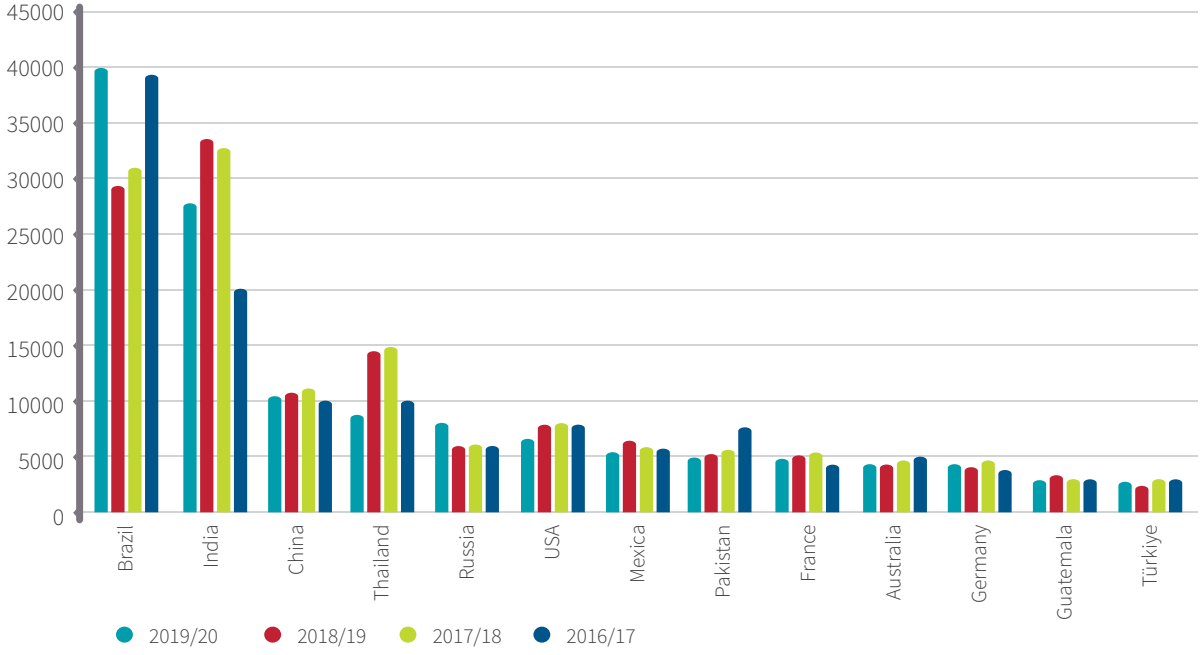


Figure 16. Major Sugar Producers of the World, (Thousand Tons, Tel Quel)
Source: International Sugar Organization (ISO) Balance Report, February 2021

Data on the consumption of the 12 countries that consume the biggest quantity of sugar in the world is presented in the graph below. India, China, the USA, and Indonesia are the leading countries, with Türkiye ranking 12th.

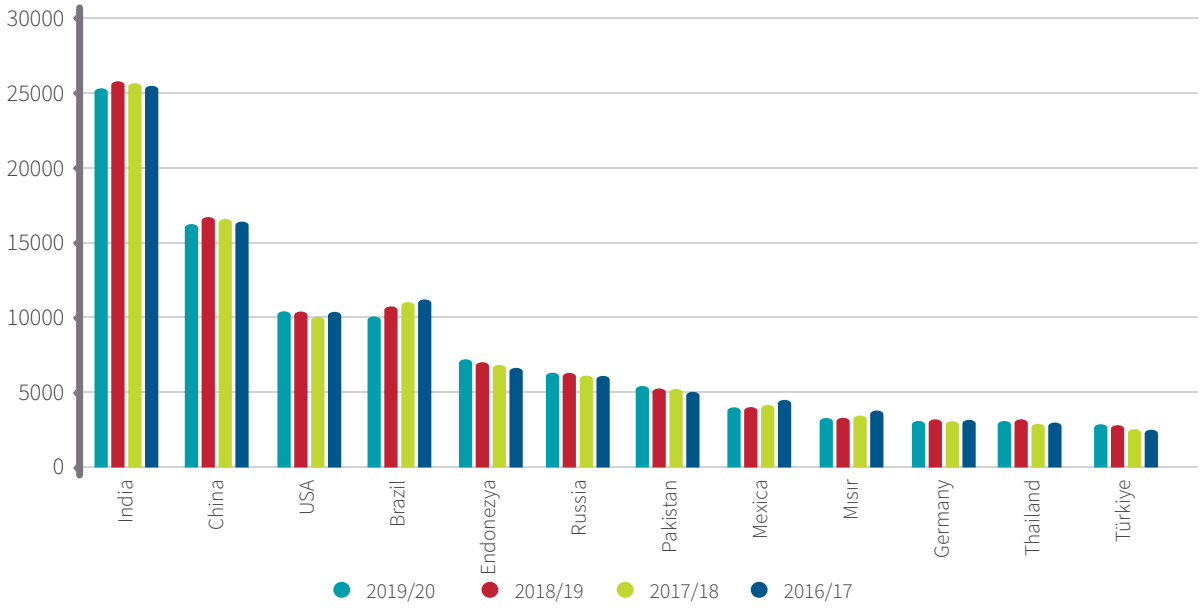


Figure 17. World's Largest Sugar Producing Countries (thousand tons, Tel quel)
Source: International Sugar Organization (ISO) Balance Report, February 2021

5.1.24.2. Sugar Sector and Policies in Türkiye

Sugar is a strategically important staple food that is produced in Türkiye with the added value it creates and the employment it generates. The sugar sector also makes important contributions to the country's agriculture and industry, especially with its by-products, particularly to livestock production.

Due to the natural competitive power in foreign markets, competition between cane sugar and beet sugar is not possible. Sustainability of the sugar sector has great importance for both agriculture and industry due to domestic demand being met with an effective structure based on production quotas.

Within this framework,

- Production planning to improve sugar beet and maize production on the most ecologically and economically suitable landscape,
- Securing the rights and responsibilities of the parties by ensuring that the parties conduct activities in accordance with contract farming terms in areas where privatized factories are located as well as publicly owned sugar factories.
- Increasing efficiency in the sugar production process,
- Optimal utilization of the by-products of the sugar production process (molasse, pulp/oil cake etc.), particularly in the animal sector, as well as the development of business models aimed at obtaining alternative products from waste and residue,

are important for the sustainability of the industry.

In conclusion, sustainable domestic production of sufficient quantities of sugar to meet domestic demand is made possible thanks to the regulations implemented through the national Sugar Act. The planned production model introduced with the Sugar Act makes regulations to respond to the country's demand with the conditions of our country's sugar sector in consideration while aiming to provide continued income to our country's farmers and sugar producers.

5.2. Meadows & Pastures

Fodder costs constitute an important percentage of input costs in animal production. Meadow and pasture size and quality are significantly connected with fodder needs. Conservation of meadows and pastures is also part of a sustainable agricultural system. The global agricultural land of approximately 5 billion hectares is in a trend of decline. A similar trend is also seen in meadow and pasture area, which comprises 2/3 of agricultural land. In line with this trend, meadow and pasture area declined from 3.4 billion ha in 2000 to under 3.3 billion hectares in 2016[64].

Table 40. Global Meadow and Pasture Situation

	Agricultural land (million ha)	Meadow and pasture area (permanent) (million ha)	Share of meadow and pastures in total agricultural land (%)
2000	4.954,6	3.417,1	69,0
2005	4.940,1	3.385,9	68,5
2010	4.868,5	3.321,2	68,2
2011	4.879,2	3.318,9	68,0
2012	4.886,0	3.314,6	67,8
2013	4.883,4	3.308,5	67,8
2014	4.897,5	3.313,6	67,7
2015	4.868,1	3.274,2	67,3
2016	4.869,6	3.276,9	67,3
2017	4.814,8	3.246,8	67,4
2018	4.801,3	3.233,6	67,3

Source: FAO, 2018

According to 2019 OECD data, Türkiye ranks 13th in OECD countries in terms of meadow and pasture assets.

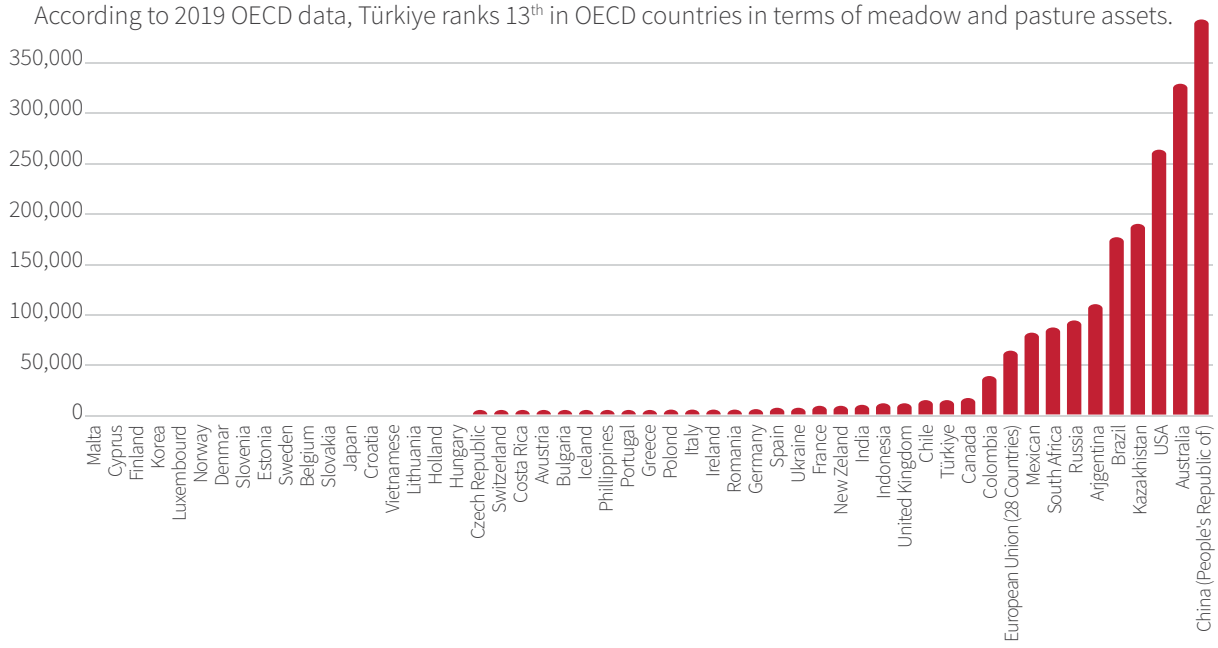


Figure 18. OECD Countries Pasture Assets (OECD [65])

64 Forage Industry Policy Document 2019-2023, Ministry of Agriculture and Forestry, Directorate of Agricultural Economy and Policy Development Institute
65 https://data.oecd.org/agrland/agricultural-land.htm. Accessed: 08.09.2019.

Türkiye's pasture areas declined significantly until 2002. Factors accounting for such decline include the areas being opened for plant production, uninformed and uncontrolled grazing (premature and excessive grazing, grazing too many animals), and necessary maintenance not being performed on time. Pasture reform and management projects implemented on a national scale aim to reform summer and winter pastures to increase grazing capacity, improve grass quality, and prevent erosion through the implementation of soil conservation measures. Türkiye's pasture size is 14.6 million ha as of 2020. Türkiye's meadow and pasture areas are located mainly in the Eastern Anatolia, Black Sea, and Central Anatolia regions.

Table 41. Determination and Restriction (ha) pursuant to Pasture Law by Years, ha, 1998-2019

Years	Determination	Restriction
1999	97,788	73,481
2000	386,597	284,860
2001	634,482	460,644
2002	1,064,208	846,247
2003	1,428,221	249,229
2004	810,286	402,500
2005	690,026	244,673
2006	884,877	312,681
2007	1,056,656	453,955
2008	530,000	233,872
2009	619,562	253,042
2010	306,028	299,716
2011	205,621	211,471
2012	771,184	816,499
2013	659,950	617,519
2014	202,683	222,712
2015	414,637	288,368
2016	135,638	333,192
2017	86,122	208,110
2018	75,100	810,959
2019	942,669	634,281
Toplam	12,002,335	8,258,011

Source: Ministry of Agriculture and Forestry

5.3. Organic Agriculture

Global organic food market continues to grow, having reached 129 billion USD in 2019. USA is the prominent market, followed by Germany and France[66]. 1.5% of global agricultural land is organic. According to 2019 data, Türkiye globally ranks 18th in the share of total agricultural land in organic farming (1.4%) and 7th in organic producers.

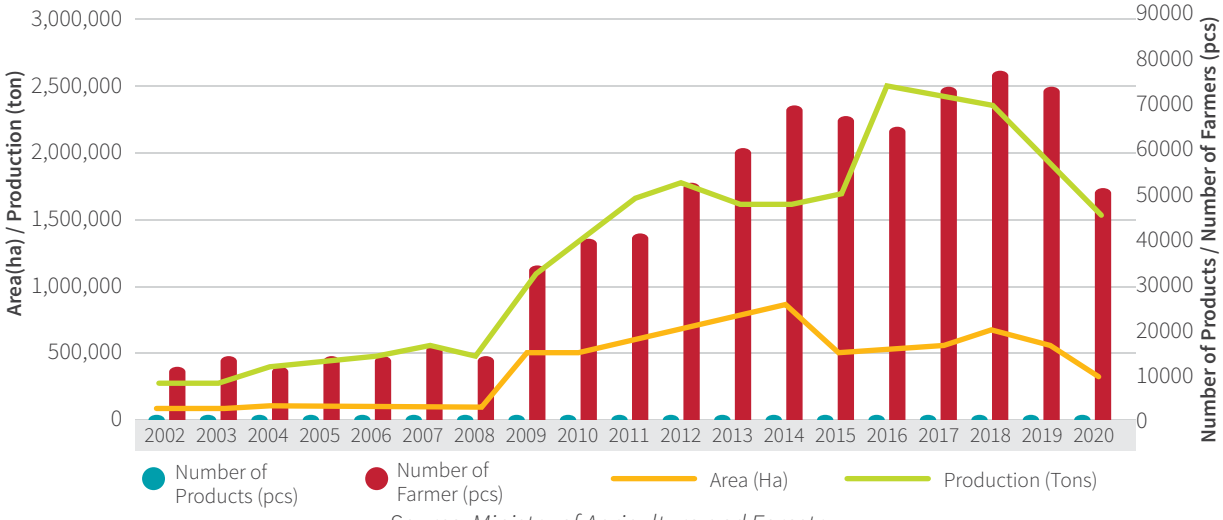
Increased demand for high-quality food in recent years has also lead to increased interest in the organic sector. Türkiye has huge potential for organic farming with its different climatic conditions and biodiversity, and uses lower quantities of fertilizer and agricultural pesticide than the EU, Asia and world averages. Although organic farming still constitutes a small share

66 https://www.ifoam.bio/en/system/files/fibl-press-release-world-2019-02-13-english.pdf (Updated according to IFOAM 2021 data.

of total arable land, the number of farmers, cultivation area, and production are on the rise. According to 2020 Ministry of Agriculture and Forestry data, the number of farmers working in organic plant production is 52,590, organic plant production area is 382,665 ha, and organic plant production is 1,631,943 tons. Within this framework, production area and the number of farmers increased by 3 times and production amount increased approximately 4 times since 2002 .

Table 42. Organic Plant Production

	Number of Products	Number of Farmers		Area (1)		Production	
	(Pcs)	(Pcs)	Change (%)	(Hectares)	Change (%)	(Tons)	Change (%)
2002	150	12,428	-	89,827	-	310,125	-
2003	179	14,798	19.1	113,621	26.5	323,981	4.5
2004	174	12,751	-13.8	209,573	84.4	377,616	16.6
2005	205	14,401	12.9	203,811	-2.7	421,934	11.7
2006	203	14,256	-1.0	192,789	-5.4	458,095	8.6
2007	201	16,276	14.2	174,283	-9.6	568,128	24.0
2008	247	14,926	-8.3	166,883	-4.2	530,224	-6.7
2009	212	35,565	138.3	501,641	200.6	983,715	85.5
2010	216	42,097	18.4	510,033	1.7	1,343,737	36.6
2011	225	42,460	0.9	614,618	20.5	1,659,543	23.5
2012	204	54,635	28.7	702,909	14.4	1,750,127	5.5
2013	213	60,797	11.3	769,014	9.4	1,620,466	-7.4
2014	208	71,472	17.6	842,216	9.5	1,642,235	1.3
2015	197	69,967	-2.1	515,268	-38.8	1,829,291	11.4
2016	238	67,878	-3.0	523,777	1.7	2,473,600	35.2
2017	214	75,067	10.6	543,033	3.7	2,406,606	-2.7
2018	213	79,563	6.0	626,885	15.4	2,371,612	-1.5
2019	213	74,545	-6.3	545,870	-12.9	2,030,466	-14.4
2020	235	52,590	-29.5	382,.665	-29.9	1,631,943	-19.6



Source: Ministry of Agriculture and Forestry
(1) Includes natural foraging area

5.4. Greenhouse Farming

Türkiye is among the top 4 countries in the world in greenhouse size, sharing the number one spot in Europe with Spain. Greenhouse farming occupied 80,516 hectares of land in 2020. Greenhouse farming accounted for 25% of total fresh vegetable production in 2020 with 7.8 million tons, with 16% of this production being exported. Our greenhouse farming consists of 94% vegetable, 5% fruit, and 1% ornamental plant production. Tomato ranks first (4.1 million tons), cucumber ranks second (1.1 million tons), and watermelon ranks third (849,000 tons) in greenhouse vegetable production. In fruit production, banana ranks first (543,000 tons), and strawberry ranks second (203,000 tons). The following table presents the values for greenhouse farming.

Table 43. Greenhouse Production (million tons)

Product	2000	2002	2017	2018	2019	2020	2000-2020 Increase (%)
Vegetable	3.7	4.2	7.4	7.5	7.8	7.8	110.8
Fruit	0.06	0.11	0.48	0.54	0.62	0.75	1150.0
Total	3.7	4.3	7.9	8.1	8.4	8.5	129.7

Source: TURKSTAT

5.5. Ornamental Plants

Türkiye's ecological features, suitable climatic and soil conditions, and availability of gene pools for most ornamental plants provide an advantage for the ornamental plant sector. The ornamental plant sector is grouped under four headings[67];

- Cut flowers
- Outdoor ornamental plants
- Indoor ornamental plants
- Natural bulbs

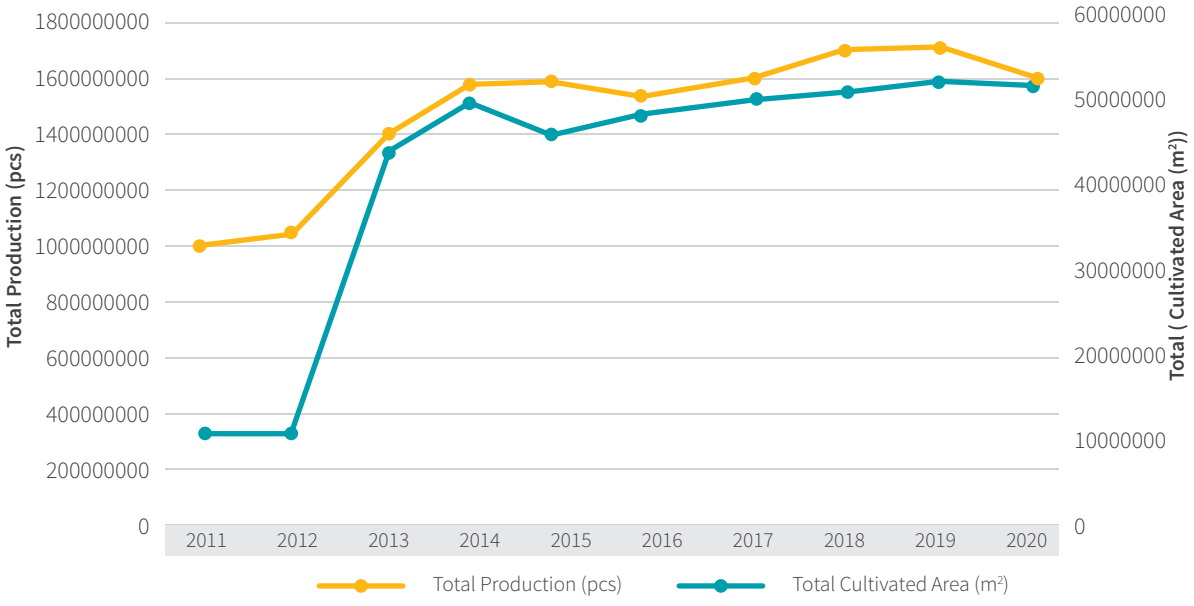
According to a report based on 2018 data and published by the Ornamental Plants and Products Exporters Association[68], the leading countries in cultivation area are India with 308,000 ha, China with 181,840 ha, USA with 29,407 ha, Mexico with 16,818 ha, Brazil with 14,992 ha, and Thailand with 12,324 ha.

The following table includes data on Türkiye's total ornamental plant cultivation area and production by year. Ornamental plant production increased by 5 times since 2011, with a 64% increase in total production.

67 https://arastirma.tarimorman.gov.tr/beykozbbgam/Belgeler/Teknik%20Bilgi/S%C3%BCs%20Bitkileri.pdf. Erişim Tarihi: 11.09.2019.
68 http://www.susbitkileri.org.tr/images/d/library/ea42e662-b5f3-4b88-a02d-219ca8567b80.pdf. Accessed: 11.09.2019.

Table 44. Türkiye's Ornamental Plant Cultivation Area and Production

Year	Total (Cultivation Area, m²)	Total Production (count)
2011	11,418,638	1,044,195,929
2012	11,777,307	1,077,199,887
2013	45,125,717	1,443,515,850
2014	49,018,343	1,553,025,200
2015	46,197,215	1,555,300,960
2016	48,801,686	1,513,901,369
2017	50,089,031	1,619,027,841
2018	51,802,644	1,711,773,663
2019	52.477.362	1,718,098,240
2020	54.128.046	1,661,449,405



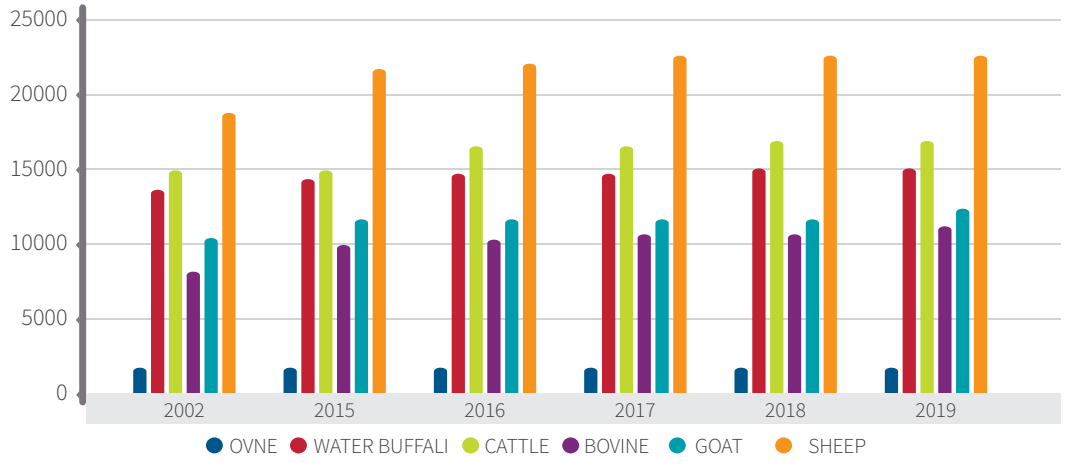
Source: TURKSTAT

5.6. Livestock

Livestock production is an important economic sub-sector of the agriculture sector with the added value it creates, the employment it generates, the contributions it makes to national income, the resource support it provides to different industrial branches (food, textile, pharmaceutical, livestock tools and equipment, and cosmetics), and the protein it provides for adequate and balanced nutrition. It is also a social agricultural sub-sector with the support it provides to rural areas by generating employment. The following table presents global livestock size according to FAO data.

Table 45. World Livestock Assets (Head)

		2002	2015	2016	2017	2018	2019	2002-2019 Change %	2015-2019 Change %
		million	million	million	million	million	million		
WORLD	WATER BUFFALO	168.75	199.65	200.52	201.08	202.77	204.34	21.10	1.91
	CATTLE	1332.96	1452.01	1470.41	1477.80	1494.16	1511.02	13.36	2.76
	BOVINE	1501.71	1651.66	1670.93	1678.87	1696.93	1715.36	14.23	2.66
	GOAT	783.69	1004.13	1031.05	1045.22	1060.87	1094.07	39.60	6.11
	SHEEP	1036.14	1183.90	1197.36	1211.12	1217.62	1238.72	19.55	3.45
	OVINE	1819.83	2188.04	2228.41	2256.34	2278.49	2332.79	28.19	4.68

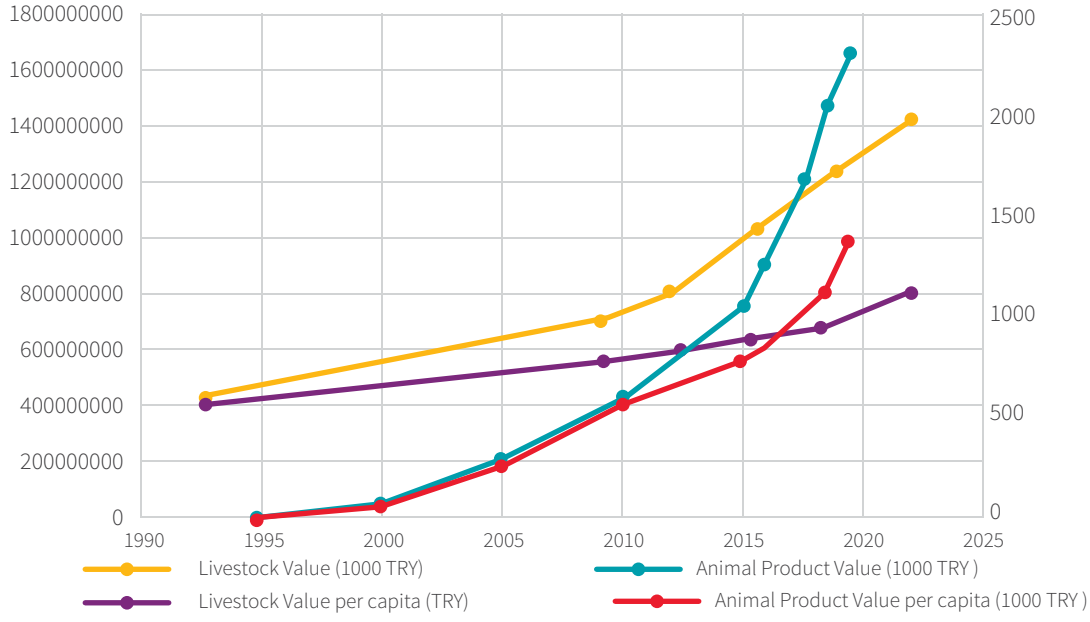


Source: FAOSTAT

Türkiye's livestock value, animal product value, livestock per capita value, and animal product per capita value increased significantly from 1995 to 2020. In the 1995-2020 period, livestock value increased by 300 times and animal product value increased by 244 times, while livestock value per capita tripled and animal product value per capita doubled in the 2010-2020 period.

Table 46. Animal Production and Animal Product Value

Year	Livestock Value (1000 TRY)	Animal Product Value (1000 TRY)	Livestock Value per capita (TRY)	Animal Product Value per capita (TRY)
1995	549,273	384,641		
2000	6,652,065	5,152,206		
2005	20,919,260	16,506,022		
2010	46,873,045	38,128,120	636	517
2015	73,102,253	55,670,771	928	707
2016	89,865,606	62,166,678	1126	779
2017	117,796,767	69,926,450	1458	865
2018	146,184,051	79,150,212	1783	965
2019	165,318,007	93,917,545	1988	1129

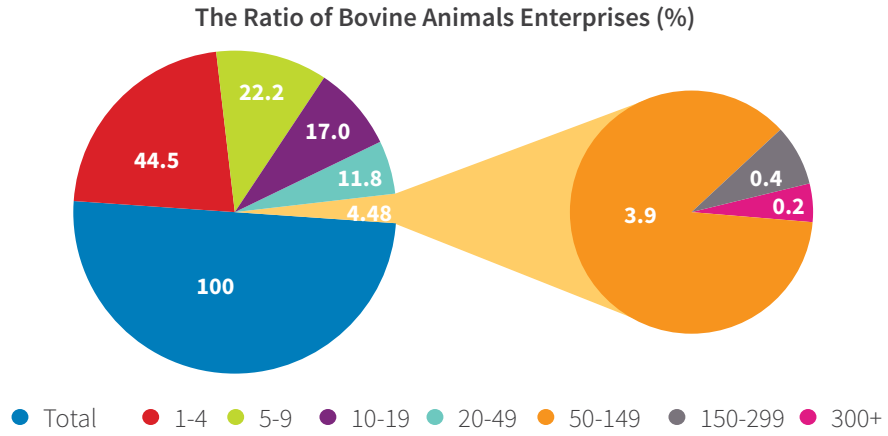


Source: TURKSTAT

Türkiye's animal production structure is shown below according to the Agricultural Enterprise Structure Research published decennially by TURKSTAT (2016)[69]. Accordingly;

- In terms of bovine livestock enterprises, the share of enterprises with a number of 1-4 animals is 44.5%, the share of enterprises with a number of 5-9 animals is 22.5%, the share of enterprises with a number of 10-19 animals is 17%, and the share of enterprises with a number of 20-49 animals is 11.8%, with enterprises with less than 50 animals making up 95.5% of total bovine livestock enterprises. Enterprises with over 300 animals constitute %2 of all livestock enterprises, accounting for 14.4% of total bovine assets.

69 TURKSTAT. Agricultural Enterprise Structure Research (2016-19.04.2018), TUIK News Bulletin. http://tuikweb.tuik.gov.tr/OncekiHBArama.do. Accessed: 02.08.2018.



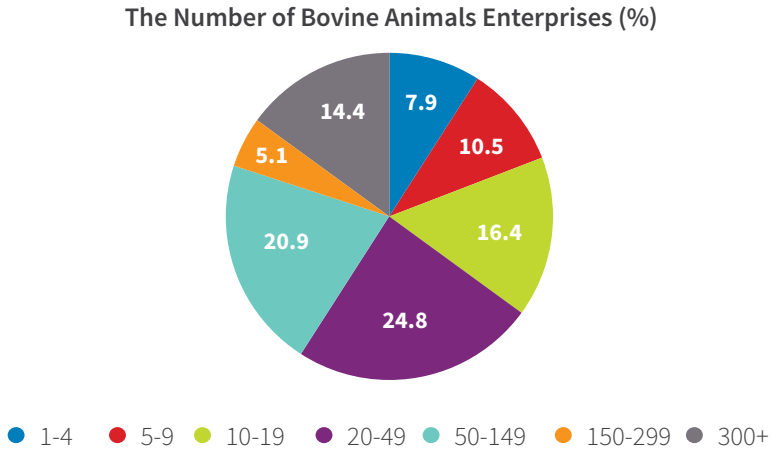


Figure 19. The Number of Bovine Farming Enterprises and Share of Bovine Animals (%) in Türkiye as of 2016
Source: TURKSTAT 2018

- In terms of ovine farming enterprises, the share of enterprises with a number of 1-4 animals is 11%, the share of enterprises with a number of 5-9 animals is 10.3%, the share of enterprises with a number of 10-19 animals is 14%, and the share of enterprises with a number of 20-49 animals is 17.7% percent of total ovine livestock enterprises, with enterprises with less than 50 animals making up 50% of total ovine farming enterprises. Enterprises with over 50 animals constitute %47 of all ovine farming enterprises, accounting for 90.9% of total ovine assets.

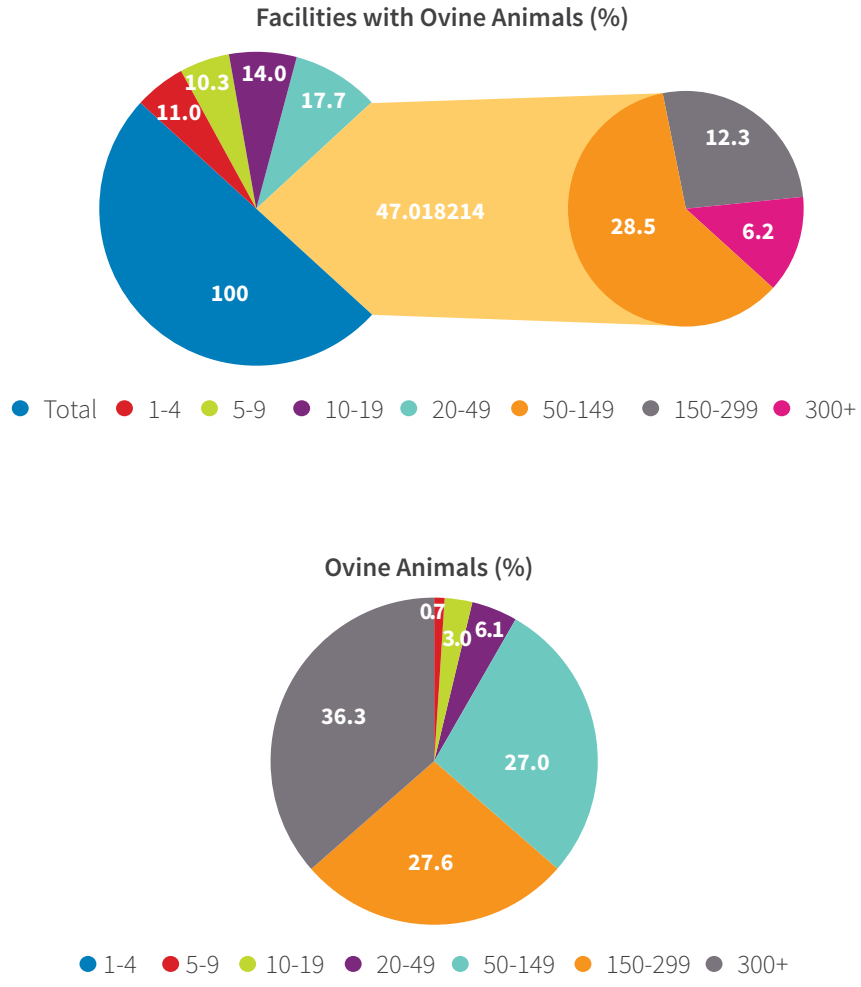


Figure 20. Ovine Farming Enterprises and Share of Ovine Animals (%) in Türkiye as of 2016
Source: TURKSTAT, 2018

An overall view of Türkiye's animal sector is presented in the General Information about Türkiye Section.

5.6.1. Bovine and Ovine Breeding, Red Meat and Milk Production

With its growing economy and improving livestock production potential, Türkiye ranks 22nd in the world in cattle population, and 20th in water buffalo population.

Table 47. World Rankings in Cattle and Water Buffalo Assets (Head) (2019)

Cattle			Water Buffalo		
Ranking	Country	Head	Ranking	Country	Head
1	Brazil	214,659,840	1	India	109851678
2	India	193,462,871	2	Pakistan	40,002,000
3	USA	94,804,700	3	China	27,338,428
4	China	63,542,332	4	Mainland China	27,336,130
5	Mainland China	63,391,934	5	Nepal	5,308,664
6	Ethiopia	63,284,177	6	Myanmar	4,082,914
7	Argentina	54,460,799	7	Egypt	3,476,396
8	Pakistan	47,821,000	8	Philippines	2,873,561
9	Mexico	35,224,960	9	Vietnam	2,387,887
10	Sudan	31,489,000	10	Bangladesh	1,490,000
22	Türkiye	17,042,506	20	Türkiye	178,397

Source: FAO

In 2019, Türkiye ranked 9th in sheep population and 24th in goat population in the world.

Table 48. Global Sheep-Goat Assets (Head) (2019)

Sheep			Goat		
Ranking	Country	Head	Ranking	Country	Head
1	China	163,489,800	1	India	148,884,786
2	Mainland China	163,489,600	2	China	137,367,192
3	India	74,260,615	3	Mainland China	137,231,700
4	Australia	65,755,408	4	Nigeria	81,879,445
5	Nigeria	46,893,030	5	Pakistan	76,143,000
6	Iran	41,303,611	6	Bangladesh	61,107,425
7	Sudan	40,896,000	7	Chad	38,792,597
8	Chad	35/863,764	8	Kenya	35,172,749
9	Türkiye	35,194,972	9	Ethiopia	34,045,216
10	United Kingdom and Northern Ireland	33,580,000	10	Sudan	32,032,000
			24	Türkiye	10,922,427

Source: FAO

According to the 2018-2029 OECD-FAO Agricultural Outlook Report, global milk production is expected to increase by 1.7% annually in the next 10 years, outperforming most agricultural products. On the other hand, global meat production is expected to increase by over 13% in the next 10 years. Moreover, global animal disease epidemics, sanitary restrictions, and trade policies are expected to remain the main factors that affect developments and dynamics in global meat markets.

Table 49. Global Red Meat and Milk Production and Yield

	2002	2015	2016	2017	2018	2019
Water Buffalo Meat (Production)	3098641	4028373	4015875	4148116	4282242	4290212
Cattle Meat (Production)	56342203	63847528	64358236	65591737	67320903	68313894
Goat Meat (Production)	4098368	5647780	5780208	6021595	6116114	6252564
Sheep Meat (Production)	7591460	9437953	9582755	9669622	9820427	9922238
Water Buffalo Milk (Production)	71009046	109503072	115103253	126020782	132601202	133752296
Cow Milk (Production)	508973865	661089390	666161505	695240598	713734201	715922506
Goat Milk (Production)	14020022	18980642	19636527	20074070	20357736	19910379
Sheep Milk (Production)	8491152	10198376	10369935	10495900	10225238	10587020
Yield (hg/An)						
Water Buffalo Milk	14425	16998	17395	18737	19178	19128
Cattle Milk	22650	24072	24153	25654	26978	26991
Goat Milk	871	942	954	957	944	925
Sheep Milk	414	431	424	427	411	423
Water Buffalo Meat	1493	1528	1516	1554	1551	1549
Cattle Meat	2069	2178	2196	2267	2278	2105
Goat Meat	127	119	119	126	125	124
Sheep Meat	153	168	168	164	165	165

Source: FAO (2021)

With its natural conditions, agricultural structure, and traditions, Türkiye is a very suitable country for widespread ovine breeding. The number of bovine animals has increased rapidly in recent years, reaching approximately 18.2 million head of cattle and water buffalo. There are 6 native dog breeds (Boz Breed, Native Black, Eastern Anatolian Red, South Anatolian Red, Zavot, Native South Yellow) and 1 native water buffalo breed (Anatolian Water Buffalo) that have been registered. Native cattle breeds are characterized by their ability to endure extreme climate conditions and adapt to geographical conditions. Cattle population comprises 48.5% culture breeds, 41.8% hybrid breeds, and 9.7% native breeds.

Ovine breeding has particular importance for animal production in Türkiye. According to 2020 data, the country has 42.1 million head of sheep and 12.0 million head of goat. Total ovine population is 54,113,000. Native breeds have low breeding costs and tend to have high vitality and an ability to adapt to poor environmental conditions. The following table presents yearly values for Türkiye's bovine and ovine assets.

Table 50. Türkiye's Ovine and Bovine Assets By Year

Years	Calf: male (head)	Calf: female (head)	Bullock: Ages 1-2 (head)	Heifer: Ages 1-2 (head)	Cow: Age 2 and above (head)	Bull and Ox: Age 2 and above (head)	Water Buffalo (head)	Sheep (head)	Goat (head)	Poultry (head)
2002					5027026	624928	121077	25173706	6780094	251100958
2005	1235896	1316708	1238236	1663487	4591143	480970	104965	25304325	6517464	322917207
2010	1367343	1429623	1296793	1731613	5029679	514749	84726	23089691	6293233	238972961
2015	1708101	1710749	1576544	1936338	6379865	682474	133766	31507934	10416166	316332446
2016	1750982	1756885	1634111	2012106	6259026	667045	142073	30983933	10345299	333541262
2017	2146578	2107179	1930003	2242144	6874607	643075	161439	33677636	10634672	348143754
2018	2252947	2197018	2154306	2378131	7304490	755614	178397	35194972	10922427	359217862
2019	2335533	2296352	2162229	2476369	7579493	838163	184192	37276050	11205429	348784885
2020	2299200	2279087	2123919	2497499	7801427	964350	192489	42126781	11985845	386080582
2002-2020 Change %	86.04	73.09	71.53	50.14	55.19*	54.31*	58.98	67.34	76.78	58.98

Source: TURKSTAT
**Shows the 2005-2020 change %.*

Türkiye is also a major Angora Goat producer, with the Angora Goat being registered with national geographical indication. The Angora Goat was brought to Anatolia from the east of the Caspian Sea by the Turks in the 13th century, adapted well with the arid climate, and continues to be a distinguished animal in the region. The Angora Goat is known in many countries with its mohair. Mohair production, which bears importance in Türkiye, was 371 tons in 2018, and is in a trend of increase (Table 48).

Table 51. Mohair Production (tons)

YEARS	MOHAIR
2014	280
2015	325
2016	341
2017	356
2018	371
2019	380

Source: TURKSTAT

According to TURKSTAT data, Türkiye's red meat production tripled from 420,595 tons in 2002 to 1,201,469 tons in 2019. Milk production also tripled within the same period, increasing from 8,408,568 tons to 22,960,379 tons.

The following table presents the values for the number of bovine and ovine livestock and meat and milk yield per capita in Türkiye. As well as the number of animals, meat and milk yield increased significantly. The number of bovine animals increased by 74% in the last 16 years, reaching 17.2 million, while the number of ovine animals increased by 44%, reaching 46.1 million. The rapid increase in the number of cattle, water buffalo, sheep, and goat that has taken place in the last 18 years still continues with no sign of slowing down.

Table 52. Türkiye's Animal Assets and Yield per Animal

Type/Year	Cattle			Total including Water Buffalo (million)	Sheep			Goat (million)	Total (million)
	Number (million Head)	Meat Yield (kg/Head)	Milk Yield* (kg/Head)		Number (million Head)	Meat Yield (kg/Head)	Milk Yield* (kg/Head)		
2002	9.8	184.7	1.705	9.9	25.1	19.3	48	6.7	31.9
2015	13.9	269.6	3.059	14.1	31.5	19.9	77	10.4	41.9
2016	14.0	271.6	3.090	14.2	30.9	20.2	77	10.3	41.3
2017	15.9	274.1	3.143	16.1	33.6	19.5	77	10.6	44.3
2018	17.0	293	3.161	17.2	35.1	21.7	77	10.9	46.1
2002-2018 Change %	74	59	85	74	40	12	60	61	44

Source: TURKSTAT

The values for Türkiye's red meat production are presented in the following table. Meat produced from bovine animals account for most of Türkiye's red meat production. Meat produced from cattle constitutes approximately 90% of total red meat production. As of 2019, Türkiye's cattle meat production is 1,075,479 tons, sheep meat production is 109,382 tons, goat meat production is 116,536 tons, and water buffalo meat production is 73 tons. The following table presents the changes in meat production by years

Table 53. Meat Production in Türkiye (tons)

Years	Cattle	Sheep	Goat	Water Buffalo	Total
2002	327,629	75,828	15,454	1,630	420,541
2015	1,014,926	100,021	33,990	326	1,149,262
2016	1,059,195	82,485	31,011	351	1,173,042
2017	987,482	100,058	37,525	1,339	1,126,403
2018	1,003,859	100,831	13,603	402	1,118,695
2019	1,075,479	109,382	16,536	73	1,201,469
2002-2019 Change %	228.26	44.25	7.0	-95.52	185.70

Source: TURKSTAT

Global milk production (water buffalo, cattle, sheep, and goat) increased from 602 million tons in 2002 to 880 million tons in 2019. In the same period, global bovine (cattle and water buffalo) and ovine (sheep and goat) meat production increased from 71,130,672 tons to 88,778,908 tons. In the 2002-2018 period (Latest FAO population data from 2018), meat per capita remained the same at 11 kg, while milk per capita increased from 96 tons to 109 tons.

According to the table representing milk production data, Türkiye's milk production consists mostly of bovine production, with 91% of total milk production being obtained from bovine animals in 2019. The share of water buffalo milk in total milk production is considerably low. Türkiye has increased its milk production from bovine and ovine animals significantly. Milk production increased by 173% from 8,408,568 tons in 2002 to 22,960,379 tons in 2019. According to a 2018 report published by the Turkish

National Dairy Council, Türkiye's milk consumption per capita is 270 kg. The share of cow milk transferred to the industry is 50% as of 2018. Türkiye's milk self-sufficiency rate is over 100%.

Table 54. Milk Production in Türkiye (tons)

Years	Cow	Sheep	Goat	Water Buffalo	Total
2002	7,490,634	657,388	209,621	50,925	8,408,568
2015	16,933,520	1,177,228	481,174	62,751	18,654,682
2016	16,786,263	1,160,413	479,401	63,085	18,479,161
2017	18,762,319	1,344,779	523,395	69,401	20,699,894
2018	20,036,877	1,446,271	561,826	75,742	22,120,716
2019	20,782,374	1,521,455	577,209	70,341	22,960,379
2002-2019 Change %	177.44	131.44	175.36	38.13	173.06

Source: TURKSTAT

5.6.2. Poultry Breeding

Another sector in which Türkiye is competitive is meat and egg poultry farming. Türkiye is among the top 11 countries in the world in terms of chicken population, ranking 2nd in Europe in terms of production.

Poultry production has shown a rapid progress in the last thirty years with the contribution of modern production methods and developed hybrid material, and developments in health protection and nutrition. The performances of Atabey, Atak, Atak-S chicken hybrids, which are among the domestic egg-laying chicken breeds, are at competitive levels worldwide.

With its low prices, white meat plays an important role in supplying animal protein in Türkiye. According to 2019 FAO data, global poultry meat production was 118,667,000 tons, and chicken egg production was 82,599,000 tons. As seen in the following table, Türkiye ranks 10th in poultry meat production and 11th in chicken egg production in the world. On the other hand, Europe's poultry meat production was 21,619,2060 tons, with 11,073,316 tons of chicken egg production. Türkiye ranks second in Europe in poultry meat and chicken egg production.

The following table presents the values for global poultry meat and egg production.

Table 55. Global Poultry Meat Production

Ranking	Country	Poultry Meat Production (tons)				
			2016	2017	2018	2019
1	USA	18402753	18708465	19140570	19568042	20154743
2	Brazil	13149202	13234959	13607352	13511750	13516525
3	China	12636845	13423450	13552347	14790451	15147189
4	Russia	4087556	4231982	4542244	4543002	4606359
10	Türkiye	1909276	1879018	2136734	2156671	2138451

Source: FAOSTAT

Table 56. Global Egg Production

Ranking	Country	Egg Production				
		2015	2016	2017	2018	2019
1	China	465,429,230	465,807,220	538,823,048	544,310,954	576,793,049
2	USA	97,208,200	102,111,500	107,241,600	110,073,700	113253400
3	India	78,484,000	82,929,400	95,216,998	103,317,631	105,000,000
4	Mexico	50,047,736	51,324,408	52,286,755	54,187,140	55,656,270
11	Türkiye	16,727,510	18,097,605	19,281,196	19,643,711	19,898,126

Source: FAO, 20 February 2019

Moreover, according to TURKSTAT data, Türkiye's total poultry meat production increased from 696,187 tons in 2002 to 2,136,263 tons in 2020, while egg production increased from 11,555,000,000 in 2002 to 19.788.064.000 in 2020. As seen from the production values, the 2002-2020 period registered a 207% increase in poultry meat production, along with a 71% increase in egg production. Türkiye is self-sufficient in commercial poultry meat and chicken egg production, and surplus production is exported.

Table 57. Poultry Meat and Egg Production in Türkiye

Years	Egg (million)	Poultry Meat (tons)	Population (Person)	Egg (Item/person)	Poultry Meat (kg/person)
2002	11,555	696,187	68,600,000	168	10,148
2014	17,145	1,894,669	77,695,904	221	24,385
2015	16,727	1,909,276	78,741,053	212	24,248
2016	18,098	1,879,018	79,814,871	227	23,542
2017	19,281	2,136,734	80,814,525	239	26,439
2018	19,643	2,156,671	82,003,882	240	26,299
2019	19,898	2,138,451	83,154,997	239	25,935
2020	19,788	2,136,263	83,614,362	237	25,549

Source: TURKSTAT

5.6.3. Beekeeping

Located at the intersection point of three different biogeographic regions, namely Europe-Siberia, Mediterranean, and Iran-Turan, Türkiye is home to a plant diversity of approximately 12,000 plant species, a third of which is endemic.

In addition to the advantage that such an endemic plant diversity provides for bee production, Anatolia's unique geography and climatic conditions allow plants to bloom in different periods of the year, making Türkiye ecologically suitable for beekeeping. Moreover, Türkiye is the world's leading pine honey producer, accounting for up to 90% of global production.

Türkiye is also an important and huge gene centre in the world with its honey bee genetic diversity. The bee population comprises 5 different breeds and ecotypes of honey bee, namely Anatolian, Caucasian, Muğla, Thrace, and Southeast Anatolian. Of these, the Caucasian honey bee has been registered and under protection since 2004.

According to FAO data, Türkiye ranks 2nd in the world after China and 1st in Europe in colony size and honey production as of the year 2019.

Table 58. Global Beekeeping Data

GLOBAL HONEY PRODUCTION (Tons)				BEEHIVE ASSETS (COUNT)			
Country	2017	2018	2019	Country	2017	2018	2019
China	548,813	457,203	447,007	China	9,175,674	9,204,665	9,230,940
Türkiye	114,471	109,330	107,920	Türkiye	7,991,072	8,108,424	8,128,360
Canada	96,012	94,996	80,345	Iran	7,199,606	7,358,163	7,516,720
Argentina	79,468	78,927	76,379	Ethiopia	6,090,804	6,082,684	6,220,182
Iran	75,835	75,463	70,528	Russia	3,316,977	3,182,399	3,093,859
USA	71,179	69,857	67,596	Argentina	2,975,942	2,980,484	2,985,026
Ukraine	71,279	69,937	66,231	Tanzania	2,984,290	2,968,267	2,952,244
Russia	67,612	67,141	66,635	Spain	2,904,971	2,965,557	-
India*	65,167	65,006	63,526	USA	2,684,000	2,828,000	2,812,000
Mexico	64,253	61,986	51,066	Mexico	1,853,807	2,172,107	2,157,866
Total	1,926,289	1,882,001	1,852,598	Total	90,970,949	89,557,448	90,116,413

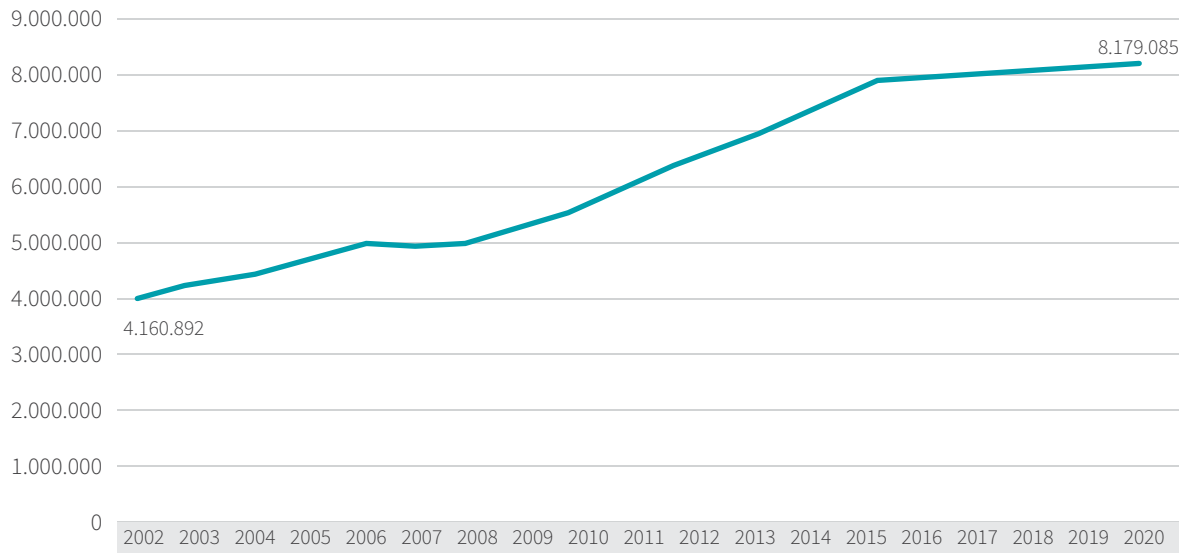
Source: FAOSTAT

**Could not be included in the number of hives list due to the bee breed being different.*

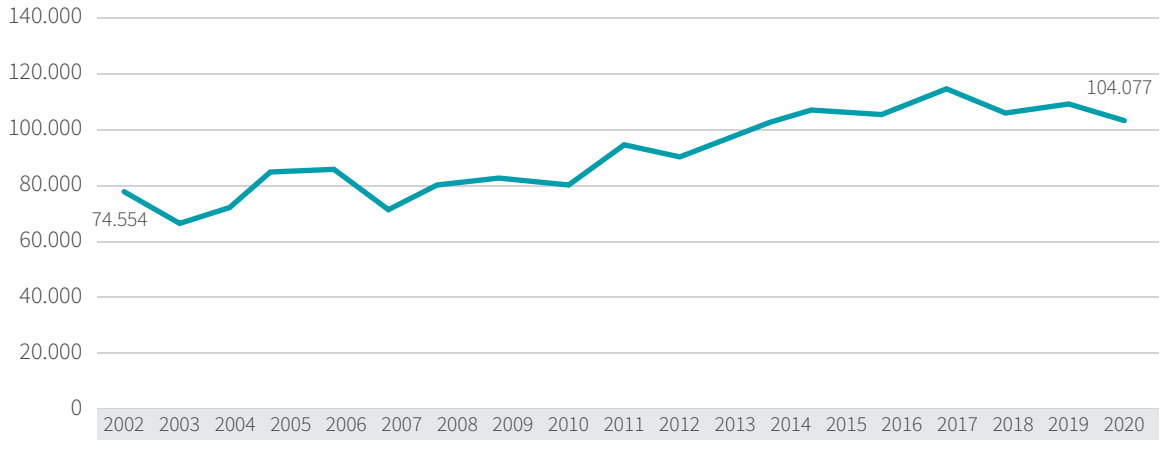
The following table presents data on Türkiye's number of beehives, honey production, beeswax, and honey production per capita, according TURKSTAT data. According to the data, Türkiye's number of beehives (97%), honey production (40%), beeswax (9%), and honey production per capita (14%) increased significantly between 2002 and 2020.

Table 59. Beekeeping Data

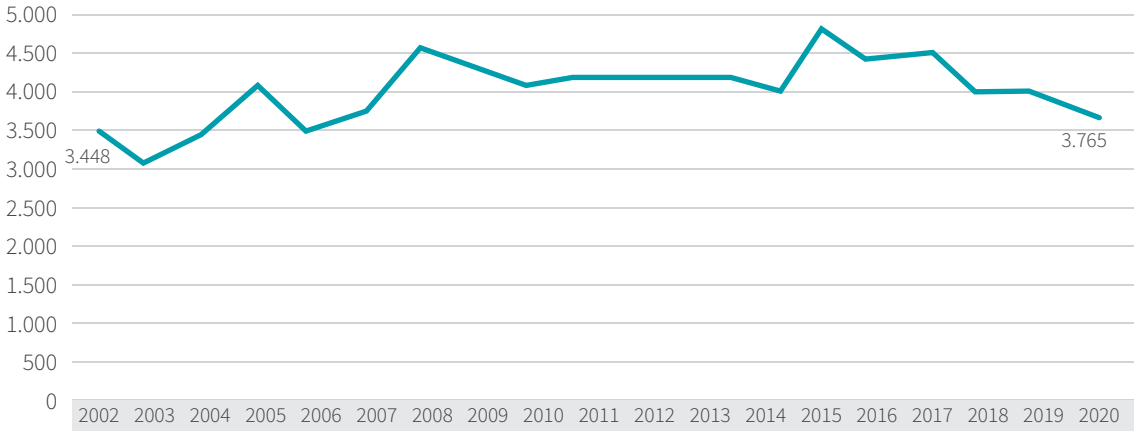
Years	Beehive (count)	Honey Production (tons)	Beeswax (tons)	Honey Production per capita (kg/capita)
2002	4,160,892	74,554	3,448	1.08
2003	4,288,853	69,540	3,130	1.00
2004	4,399,725	73,929	3,471	1.06
2005	4,590,013	82,336	4,178	1.17
2006	4,851,683	83,842	3,484	1.19
2007	4,825,596	73,935	3,837	1.04
2008	4,888,961	81,364	4,539	1.13
2009	5,339,224	82,003	4,385	1.13
2010	5,602,669	81,115	4,148	1.10
2011	6,011,332	94,245	4,235	1.26
2012	6,348,009	89,162	4,222	1.18
2013	6,641,348	94,694	4,241	1.23
2014	7,082,732	103,525	4,053	1.32
2015	7,748,287	108,128	4,756	1.37
2016	7,900,364	105,727	4,440	1.32
2017	7,991,072	114,471	4,488	1.42
2018	8,108,424	107,920	3,987	1.32
2019	8,128,360	109,330	3,971	1.31
2020	8,179,085	104,077	3,765	1.24
2002-2020 Change %	96.57	39.60	9.19	14.8



BEEHIVES (PCs)



HONEY PRODUCTION (TONS)



WAX (TONS)

Source: TURKSTAT

5.6.4. Sericulture

With its low initial investment costs and limited input, sericulture is a historically significant activity that can be operated on a small scale. Türkiye ranks 8th in the world and 1st in Europe in cocoon production. Sericulture is carried out in approximately 50 provinces, with the major provinces being Antalya, Ankara, Bilecik, Bolu, Bursa, Diyarbakır, Eskişehir, Hatay, İzmir, Muğla, and Sakarya. Approximately 2,500-3000 families work in Türkiye's traditional cocoon production. The following table presents data on the number of villages, number of families, opened boxes, and cocoon production.

Table 60. Sericulture Data

YEARS	NUMBER OF VILLAGES (count)	NUMBER OF HOUSEHOLDS (count)	OPENED BOX (count)	COCOON PRODUCTION (Tons)
2002	327	2,356	3,885	99
2003	280	2,758	5,094	169
2004	272	2,888	5,161	145
2005	278	2,677	5,669	160
2006	246	2,553	5,699	129
2007	233	2,274	5,273	127
2008	212	2,193	5,564	127
2009	211	2,295	5,683	140
2010	193	2,134	5,477	129
2011	299	2,623	5,808	151
2012	342	2,572	5,576	134
2013	328	2,348	5,266	121
2014	340	1,760	3,739	80
2015	474	1,956	4,674	115
2016	576	2,001	5,303	103
2017	659	2,128	5,686	102
2018	693	2,210	6,238	94
2019	675	2,062	5,890	90
2020	665	1,965	5,775	90
2002-2020 Change %	103	-16	148	-9

Source: TURKSTAT

5.6.5. Fisheries and Aquaculture

Türkiye is surrounded on 3 sides by seas that have different ecological, geographical, geomorphological, and meteorological features and production potentials. Türkiye, which has a coast on the Black Sea, the Aegean Sea, and the Mediterranean, has all of the Marmara Sea, which is an inland sea. There are numerous rivers, 200 natural lakes, 822 dam lakes, and approximately 507 ponds in its 25 river basins, offering broad opportunities for fisheries and aquaculture.

This offers significant opportunities for aquaculture hunting and breeding. Türkiye has adequate fishing vessels and technology as well as aquaculture facilities, technology, and human resources to utilize these resources.

Türkiye's total fish production varies by year due to fluctuations in fisheries production, with between 653-785 tons of yearly fish production between 2010 and 2020. Similarly to global production, Türkiye's aquaculture production continues to increase, with aquaculture's share in total production also increasing, as presented in the following table.

Türkiye's fish production was 785,811 tons in 2020, comprising 37.2% marine fish, 5.0% other marine products, 4.2% inland sea products, and 53.63 % aquaculture products. Fishery production was 364,400 tons, while aquaculture production was 421,411 tons.

Table 61. Türkiye Fisheries and Aquaculture Production (tons)

Years	FISHERIES			AQUACULTURE			TOTAL PRODUCTION
	Sea	Inland Water	Total	Sea	Inland Water	Total	
2010	445,680	40,259	485,939	88,573	78,568	167,141	653,080
2011	477,658	37,097	514,755	88,344	100,446	188,790	703,545
2012	396,322	36,120	432,442	100,853	111,557	212,410	644,852
2013	339,047	35,074	374,121	110,375	123,019	233,394	607,515
2014	266,078	36,134	302,212	126,894	108,239	235,133	537,345
2015	397,731	34,176	431,907	138,879	101,455	240,334	672,241
2016	301,464	33,856	335,320	151,794	101,601	253,395	588,715
2017	322,173	32,145	354,318	172,492	104,010	276,502	630,820
2018	283,955	30,139	314,094	209,370	105,167	314,537	628,631
2019	431,572	31,596	463,168	256,930	116,426	373,356	836,524
2020	331,281	33,119	364,400	293,175	128,236	421,411	785,811
2010-2020 Change %	-25.67	-17.74	-25.01	231.00	63.22	152.13	20.32

Source: TURKSTAT

5.6.5.1. Fisheries

80-90% of Türkiye's capture fisheries production consists of fish, with the rest consisting of other sea products such as crustaceans and molluscs.

Fisheries production has been showing a trend of fluctuation in the last years. This fluctuation seen year to year in fisheries is caused by changes in the catch quantity of migratory fish such as anchovy, sprat, and bonito, which make up the majority of fishing. The catch of these fish is dependent on various environmental factors such as the climate change, biology of the fish and water temperature.

Due to the high fishing power of the fishing fleet, restrictions on the vessels engaging in fishing were introduced after 2002 and new vessels were prevented from joining the fleet in order to maintain stocks. Since 2012, the fleet was shrunk and buy-back supports were implemented, with 1264 vessels being removed from the fleet. As of the end of 2020, 15,302 vessels have sea fishing licenses, with 3,181 licensed vessels located on inland waters.

5.6.5.2. Aquaculture

While Türkiye's fisheries production fluctuates by years, aquaculture production has increased every year since 2002. The share of aquaculture in Türkiye's total fish production increased from 10% in the early 2000's to 25% percent in 2010, reaching approximately 53% in 2020. These developments have parallels with the development of aquaculture in the world.

Trout is the most bred species in inland waters while bass and bream are prominent in seas. While trout production has remained the same in recent years, bass and bream production has been increasing rapidly. 146.6 tons of trout, 109,8 thousand tons of bream, and 148,9 thousand tons of bass were produced in 2020.

Table 62. Türkiye Aquaculture Production (tons)

Years	Trout			Bream	Bass	Other	TOTAL
	Inland Water	Sea	Total				
2010	78,165	7,079	85,244	28,157	50,796	2,944	167,141
2011	100,239	7,697	107,936	32,187	47,013	1,654	188,790
2012	111,335	3,234	114,569	30,743	65,512	1,586	212,410
2013	122,873	5,186	128,059	35,701	67,913	1,721	233,394
2014	107,983	5,610	113,593	41,873	74,653	5,014	235,133
2015	101,166	6,872	108,038	51,844	75,164	5,288	240,334
2016	101,297	5,716	107,013	58,254	80,847	7,281	253,395
2017	103,705	5,952	109,657	61,090	99,971	5,784	276,502
2018	104,887	9,610	114,497	76,680	116,915	6,445	314,537
2019	116,053	9,692	125,745	99,730	137,419	10,462	373,356
2020	127,905	18,689	146,594	109,749	148,907	16,161	421,411

Source: TURKSTAT

Along with the increase in aquaculture, the number and capacity of facilities also saw a natural increase.

The number of aquaculture enterprises increased from 1,245 in 2002 to 2,139 at the end of 2020.

5.6.5.3. Fisheries and Aquaculture Product Processing

The fisheries sector makes important contributions to providing food security, generating employment, domestic and foreign trade, and the national economy at a micro and macro level.

As of 2018, there are 217 fish processing facilities (10 bivalve processing facilities, 16 frog leg and snail processing facilities). Moreover, there are 13 fish flour-oil factories, mostly located on the coast of East and Central Black Sea.

The quantity of fishery products used fresh, chilled, frozen, or processed for human consumption depends on the fluctuations in catch and the quantity processed in the fish flour-oil industry. The Turkish population has a habit of consuming fishery products fresh and in season. Therefore, most fisheries and aquaculture products are consumed fresh. Processed products are aimed more at exports. The majority of processed fishery products consists of frozen products and fish fillets prepared in various ways.

5.6.5.4. Foreign Trade in Fishery Products

The fisheries sector is one of Türkiye's important sectors for exports. Parallel to the developments in aquaculture production and processing technologies, there is a significant increase in fishery exports.

Exports increased from 27,000 tons in 2002 to 201 thousand tons in 2020, while exports value increased from 97 million dollars to 1.63 billion dollars. In the same period, fishery product imports increased from 23,000 tons in 2002 to 85 thousand tons in 2020, while imports value increased from 19 million dollars to 156 million dollars.

Türkiye's most important export items are trout, bream, and bass, which are produced through aquaculture, and the Bluefin Tuna, which has high trade value and is fed and grown in net cages after being caught.

Türkiye exports to numerous countries in the world. Türkiye exported to more than 80 countries in 2020, with EU countries accounting for 60% of exports. Türkiye exports the most to the Netherlands, Italy, and Russia.

Table 63. Türkiye's Fisheries Exports and Imports

Years	EXPORTS			IMPORTS		
	Quantity (tons)	Value ($)	Value (₺)	Quantity (tons)	Value ($)	Value (₺)
2010	55,109	312,935,016	471,459,989	80,726	133,829,563	200,395,897
2011	66,738	395,306,914	664,333,252	65,698	173,886,517	290,826,203
2012	74,007	413,917,190	744,907,572	65,384	176,402,894	317,626,975
2013	101,063	568,207,316	1,083,243,678	67,530	188,068,388	359,490,196
2014	115,381	675,844,523	1,481,211,383	77,551	198,273,838	435,691,472
2015	120,963	691,552,284	1,877,838,802	110,761	250,969,660	685,467,749
2016	145,440	790,232,095	2,398,048,797	82,074	180,753,629	548,878,092
2017	157,061	855,088,029	3,129,448,087	100,446	230,127,804	841,444,645
2018	177,074	952,001,252	4,579,495,053	98,297	188,951,045	898,785,064
2019	200,226	1,025,617,723	5,818,776,189	90,684	189,438,745	1,076,227,706
2020	201,157	1,063,840,880	7,518,399,091	85,269	156,928,794	1,101,954,770

Source: TURKSTAT

In the 2010-2019 period, Türkiye exported between 5,600 and 30,200 tons of fishery products to COMCEC countries yearly, accounting for 9-20% of total exports.

Türkiye's main policy on fisheries is based around the framework of sustainability through pursuing a balance between the conservation and utilization of its fishery resources in its seas and inland waters. The main policy on aquaculture is based around achieving environmental, economic, and social sustainability by using environmentally friendly production methods.

It is widely accepted that the world has reached a limit for fisheries, with efforts being made to maintain current production levels instead of increasing fisheries production. For this reason, conservation of water resources and the fish stocks located at these resources is the core principle of sustainable fisheries.

Türkiye has made significant progress regarding its compliance to responsible fishing principles in the last 20 years. Important steps taken in this regard include limiting the fishing fleet, shrinking the fleet through buy-backs, amendments to the Fisheries Law implemented as of 1 January 2020, new regulations on fisheries management implemented through guidelines and directives, monitoring the 1,650 fishing vessels that are over 12 meters in size by satellite, actively tackling Illegal, Unreported, and Unregulated fishing by employing nationally developed

technological capabilities, certifying and inspecting aquaculture facilities, and relocating coastal net cages to open waters. Protective measures need to be taken in the future as well in order to maintain the sustainability of resources. Moreover, these measures are not only a necessity of national needs, but also entail international obligations in the globalizing world.

Türkiye's trend of growth in fisheries and aquaculture production processes shows similarities to the rest of the world. Aquaculture production is increasing along with the share of aquaculture in total production. This increase is expected to continue in the future. The Ministry of Agriculture and Forestry determined Türkiye's aquaculture production target for 2023 as 600,000 tons.

Efforts are being made to designate new areas suitable for agriculture through innovative practices and increased use of modern technology in aquaculture with the aim of utilizing the current potential in production and increasing the number of species that are being produced.

Bringing fishery products to consumers in a reliable and healthy manner is just as important as producing said products for the sector to develop, improve, and increase its competitive power in international markets. Increasing product variety by producing processed products with high added value and increasing fish consumption and sales through presenting reliable products to domestic and foreign markets is among the sector's goals. Türkiye has considerable exports potential in aquaculture products, and the Ministry of Agriculture and Forestry determined Türkiye's fishery products exports target for 2023 as 2 million dollars.

Fishery products are addressed as a separate heading in the 2019-2023 Strategic Plan of the Ministry of Agriculture and Forestry. The Plan addresses goals of conserving fisheries and aquaculture resources and achieving sustainable operation.

6

INPUT USAGE IN AGRICULTURE

Because it is not possible to substantially expand the agricultural lands included in scarce resources in increasing agricultural production, more efficient use of resources such as financing, new technologies and other inputs and accordingly increased efficiency in the unit area gain importance.

Agricultural inputs are one of the most important elements that affect the price at which the consumer has access to the product. Agricultural inputs consist of the elements such as fertilizers, water consumption for agricultural purposes, energy use, fuel (diesel etc.), pesticides, seed, seedling, sapling, labour and land[70] in agricultural production.

Agricultural inputs consist of the items such as feed, fuel-electricity, technical service, medicine, vaccine, sanitizer, machinery, equipment and automation need in animal production. The status of Türkiye in relation to agricultural inputs in the framework of Sustainable Food Systems has been examined under the following headings.

6.1. Fertilizers

One of the ways to ensure an increase in vegetative production is also to increase soil fertility, efficiency of vegetative production and production quality in the same production area. In this regard, fertilizers are one of the main elements in terms of increasing soil fertility and vegetative production quantity and they are critically important for obtaining healthy, safe and nutritious food. Fertilizers and soil conditioners for rehabilitation are also essential elements for greenhouse cultivation, greenhouses and soilless agriculture in which an increase has been observed in our country recently. Also, they make positive contribution to the improvement of soil infertility induced by soil structure, soil texture, salinity, lime and sodification. It is not possible to achieve the food security without fertilizers. Appropriate use of fertilizers will also contribute to the achievement of SDG as well as agricultural production. While fertilizers may also assist in the emergence of additional job opportunities for agricultural and industrial sectors, they are one of the cooperation areas under agriculture and food security of the D-8 Organization in which our country is also involved.

According to FAO resources, the demand for fertilizer consumption in the world increases and the global capacity of fertilizer products, intermediaries and raw material is expected to increase further in the following 5 years. Total demand for plant nutrient in the world ($N+P_2O_5+K_2O$) increased from 186,625,000 tons in 2015 to 199,006,000 tons in 2019. In the last five years between 2014-2019, the demand for nitrogen fertilizer in the world increased by 1.24%, P_2O_5 demand by 1.97%, K_2O demand by 2.47% compound growth rate.

"Fertilizer Industry" is included in Manufacturing Industry and III/d Chemical Industry Group in "The International Standard Industrial Classification of All Economic Activities" (ISIC) accepted by the United Nations[71].

While fuel and fertilizer inputs change depending on the product in agricultural production of Türkiye, they constitute a cost item that reaches 30% . Because Türkiye has low supply in terms of diesel and fertilizer raw materials (natural gas, phosphate rock, potash etc.), it is necessary to import these raw materials to a large extent. Therefore, increases in world prices and exchange rates have a direct impact on the prices of these inputs. Inputs used in fertilizer production except for limestone, clay and dolomite which are used as additives in bottom and nitrate fertilizers are met through imports. The raw material of nitrogen fertilizers is natural gas and the quantity of natural gas extracted in Türkiye is 1% of the country's consumption. The raw material of bottom fertilizers is phosphate and phosphate rock is imported from the North African countries.

Fertilizer production and consumption quantity has increased over the last 15 years in Türkiye. According to that, total physical fertilizer consumption value increased from 5,198,779 tons in 2005 to 6,087,714 tons in 2019, which corresponds to an increase of 17%. Total consumption value of plant nutrient increased from 2,068,006 tons to 2,466,416 tons, which corresponds to an increase of 19%. Physical total value of fertilizer production increased from 3,157,574 tons to 4,661,491 tons in 2005, which corresponds to an increase of 48%. During the same period, the total production value of plant nutrient increased from 1,205,864 tons to 1,741,175 tons, which corresponds to 44%. Between the years 2005-2009, the ratio of

70 Land use has been assessed in the other section.

71 Anonymous 2000, Fertilizer Industry Specialized Commission Report, 8th 5-Year Development Plan, Presidency of Strategy and Budget, (accessed: http://www.sbb.gov.tr/wp-content/uploads/2018/08_gubresanayii.pdf.

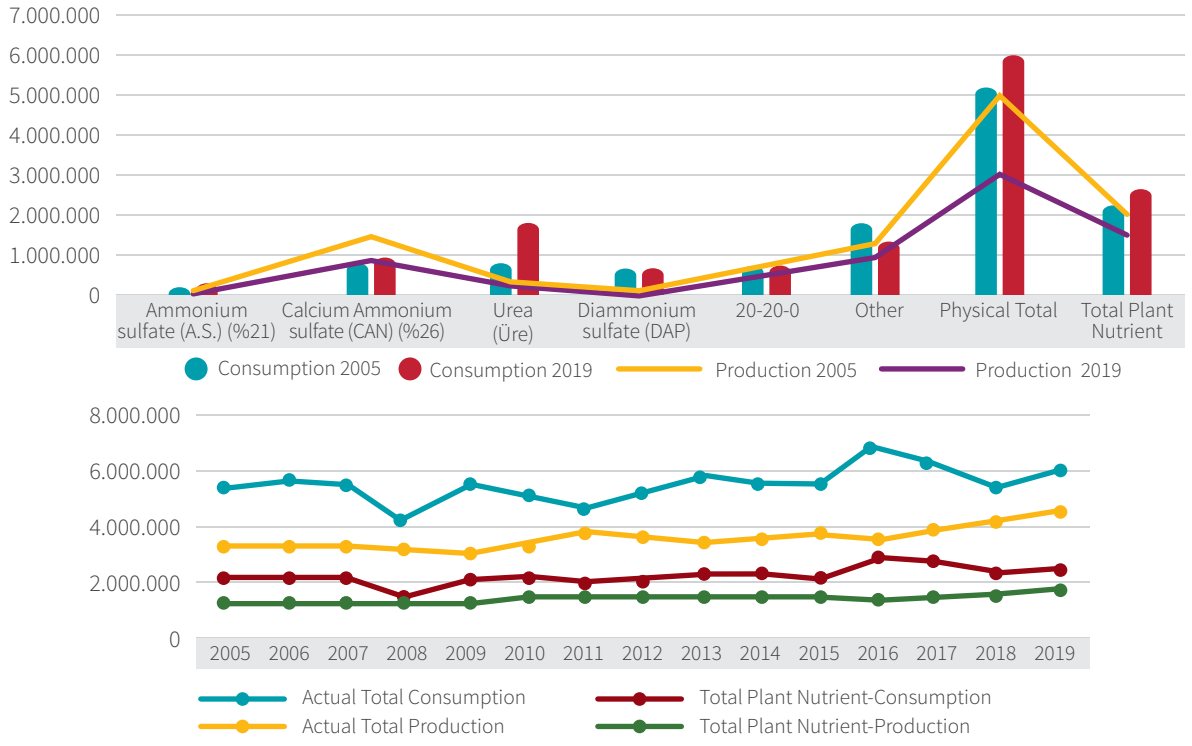
production to consumption is 63% on the basis of total plant nutrient.

According to FAO data, the world fertilizer consumption is 135 kg/ha and it is 160 kg/ha in the EU on the average in 2018. For Türkiye, this rate is 110 kg/ha in the same year, which is below the world and EU average.

According to the national database, the fertilizer consumption of Türkiye is 126 kg/ha in 2019. In this regard, Türkiye maintains its advantageous position for organic agriculture. The consumption and production values of selected fertilizers for the period 2005-2019 are presented in the following tables and figure.

Table 64. Consumption and Production Values of Selected Fertilizers in Türkiye for the period of 2005-2019

TYPE OF FERTILIZER	Consumption			Production			2005-2019 The Ratio of Production to Consumption (%)
	2005 (tons)	2019 (tons)	Change (%)	2005 (tons)	2019 (tons)	Change (%)	
Ammonium Sulphate	341,994	641,991	88	147,164	173,240	18	33
Ammonium Nitrate (26% N)	820,827	918,600	12	821,032	1,378,499	68	109
Urea	836,132	1,756,277	110	379,411	508,296	34	27
Diammonium Phosphate	621,635	610,637	-2	107,949	271,307	151	50
20-20-0	739,386	910,885	23	594,526	748,183	26	80
Other	1,838,805	1,249,324	-32	1,107,492	1,581,966	43	76
Physical Total	5,198,779	6,087,714	17	3,157,574	4,661,491	48	65
Total Plant Nutrient	2,068,006	2,466,416	19	1,205,864	1,741,175	44	63



Source: Ministry of Agriculture and Forestry

The ratio of fertilizer consumption to potential need is 67% and the ratio of production to potential need is 48% in Türkiye.

Fertilizer prices of Türkiye is parallel to world fertilizer prices. Demand-supply balance in the world, international fertilizer and raw material prices, fluctuations in exchange rate, income level of producers and agricultural support affect the fertilizer prices. However, increase in the exchange rate has also affected fertilizer prices in Türkiye over the last three years.

Unconscious fertilizer consumption both pollutes the groundwater and leads to important economic losses. On the other hand, when less fertilizer is provided than the quantity needed for the plant, adequate quantity of product is not obtained and economic losses emerge again. In order to deal with these negativities, it is critically important to identify the fertilizer need of the soil based on soil analysis and apply the fertilizer by considering the plant variety to be planted. Some measures have been taken at national level so that nation-wide soil analysis support becomes more effective. In this context, it has been ensured that soil samples are taken by staff of authorised laboratories, that the device (GPS) identifying the coordinate is utilized while taking samples and that the time elapsed is taken into account during the sampling. To that end, the condition for performing the soil analysis for 50 decares of lands and larger lands has been set in fertilizer support provided to farmers since 2009. Soil analysis support was put into practice in 2005. This practice was to raise the awareness of farmers about soil analysis-based fertilizer consumption and make the soil fertility sustainable. On the other hand, legislative studies related to the subject are conducted to make necessary improvements.

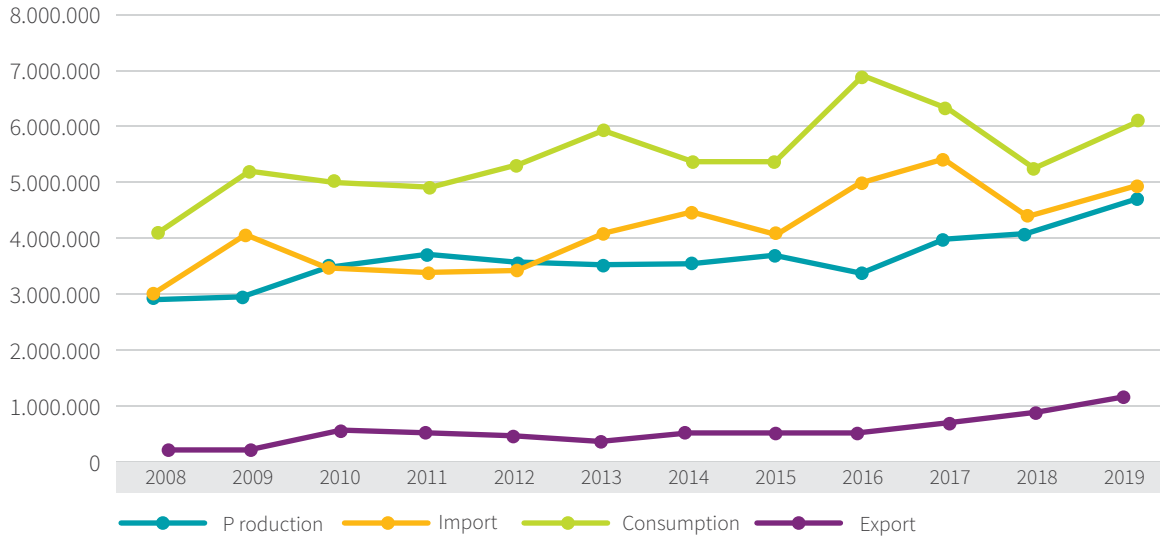
The impact of fertilizer application which is duly performed on the increase in vegetative production varies between 50% and 100%. Fertilizer consumption in Türkiye as a pure substance (2.2 million tons) is below the potential need (3.3-3.6 million tons).

While the organic fertilizer production capacity of Türkiye is 2.5 million tons, current production is 1.5 million tons. In Türkiye, there are 350 firms in total that produce organic fertilizers. Products of organic origin include organic soil conditioners, mineral soil conditioners, microbial and enzyme-based products.

Efficiency of chemical fertilizer consumption in Türkiye is 20% in phosphorus fertilizer and 50% in nitrogen and potassium fertilizers.

Table 65. Comparison of Fertilizer Data by Years

Years	Production (tons)	Imports (tons)	Total (tons)	Consumption (tons)	Exports (tons)	Total (tons)
2008	2,960,929	3,015,987	5,976,916	4,129,256	270,244	4,399,500
2009	2,878,452	4,117,454	6,995,906	5,275,619	253,417	5,529,036
2010	3,446,765	3,425,593	6,872,358	4,968,058	530,331	5,498,389
2011	3,749,921	3,327,185	7,077,106	4,766,356	487,253	5,253,609
2012	3,661,156	3,280,522	6,941,678	5,339,893	329,320	5,669,213
2013	3,576,598	4,206,030	7,782,628	5,813,612	194,247	6,007,859
2014	3,547,796	4,515,395	8,063,191	5,471,518	319,479	5,790,997
2015	3,674,262	4,156,178	7,830,440	5,507,780	310,377	5,818,157
2016	3,358,324	4,965,357	8,323,681	6,744,922	321,717	7,066,639
2017	3,841,645	5,353,780	9,195,425	6,332,872	594,560	6,927,432
2018	4,027,004	4,331,739	8,358,743	5,411,881	924,796	6,336,677
2019	4,661,491	4,929,081	9,590,572	6,087,714	1,270,676	7,358,390



Source: Ministry of Agriculture and Forestry

6.2. Fuel (Diesel)

One of the most important issues affecting production costs is the change in diesel prices included in key production inputs. Diesel costs affect all the logistic costs that range from the field preparation for planting to harvesting and delivering the product to the end consumer. There is a support mechanism implemented by MoAF without prejudging WTO commitments in relation to diesel and the farmers who are registered to national farmer registration system may benefit from this support mechanism. However, according to MoAF sources, the change in diesel prices is seasonally presented as follows from 2003 when the support began to 2019[72] .

Based on the agricultural area data announced by TURKSTAT, an average of 1.5 million tons of diesel is consumed annually for agricultural activities.

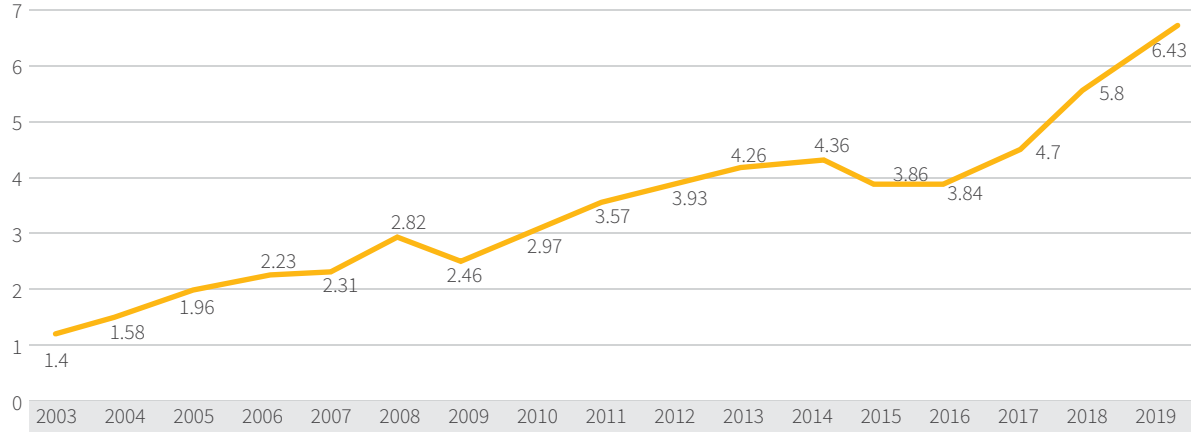


Figure 21. Change in Annual Diesel Prices (TRY/lit.)
Source: Ministry of Agriculture and Forestry

72 Ministry of Agriculture and Forestry, Plant Nutrition Statistics, (accessed: 08.09.2019), https://www.tarimorman.gov.tr/Konular/Bitkisel-Uretim/Bitki-Besleme-ve-Tarimsal-Teknolojiler/Bitki-Besleme-Istatistikleri.

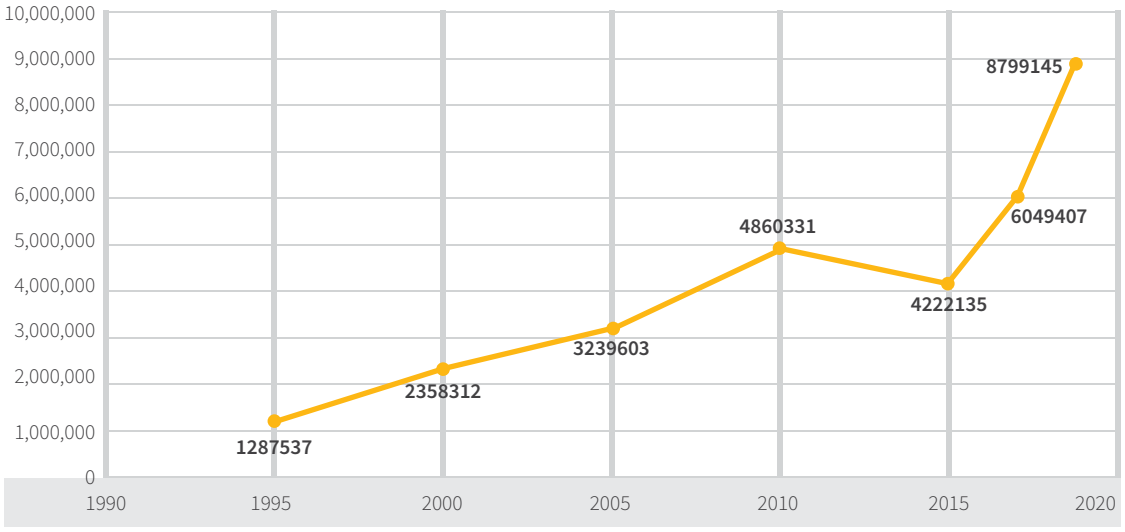
6.3. Energy Costs-Agricultural Irrigation

Irrigation cost is composed of water and electricity costs. According to the data of the Ministry of Agriculture and Forestry, General Directorate of State Hydraulic Works (DSI), the agricultural irrigation has a share of 76,7% (Basin Master Plans Summary Report, 2020) when water consumption data are examined on the basis of sectors. According to FAO data,[73] 69% of world water resources is used for irrigation. As in the world, in Türkiye, the need for agricultural irrigation which is essential for agricultural production in order to meet the food requirements of especially growing population increases.

According to TURKSTAT data in the table, the data on electricity consumption for agricultural irrigation in Türkiye are presented. According to that, electricity consumption for agricultural irrigation increased approximately fivefold in 2017 compared to 1995. Main activity-based consumer tariffs related to electric bills are approved and published by Energy Market Regulatory Authority (EMRA). According to consumption information of consumers, billing is conducted by private companies.

Table 66. Distribution of Electricity Consumption (MWh) and the Quantity of Electricity Consumed for Agricultural Irrigation by Years (MWh)

Type of Consumer	Consumption Quantity (MWh)					
	Subscriber	Ratio (%)	Free Consumer	Ratio (%)	Total	Ratio (%)
Industry	49,104,564.12	29.86	47,891,284.07	69.23	96,995,848.19	41.52
Business Organization	51,769,098.88	31.48	16,520,154.79	23.88	68,289,253.67	29.23
Dwelling	50,145,851.17	30.50	4,624,128.39	6.68	54,769,979.56	23.45
Agricultural Irrigation	8,675,761.25	5.28	123,383.98	0.18	8,799,145.22	3.77
Lighting	4,738,024.53	2.88	17,778.36	0.03	4,755,802.89	2.04
Total	164,433,299.95	100	69,176,729.59	100	233,610,029.54	100



Source: TURKSTAT, EMRA

73 http://www.fao.org/nr/water/aquastat/tables/WorldData-Withdrawal_eng.pdf, https://cevreselgostergeler.csb.gov.tr/su-kullanimi-i-85738

On the other hand, Water Consumption Service Costs to be Implemented in Irrigation Facilities Operated by Irrigation Associations are published on the basis of plant variety by the Ministry of Agriculture and Forestry. According to that, irrigation facilities operated by irrigation associations are divided into 5 groups. Irrigation associations determine the water consumption service costs to be collected from the beneficiaries of irrigation facilities in a manner that the fees will not be less than operation and maintenance fee tariffs disclosed according to balanced budget and financial sustainability principles.

Various R&D projects are developed to cover the energy costs of water pumping stations in which solar energy systems are used by DSI. The first one of the activities mentioned is Samsat Solar Energy System Project which is conducted to meet the energy need of Samsat Pumping Facility established in Adıyaman with the power of 1MW+1MW, and through which energy production is provided. In addition, the opportunities to establish a Solar Energy System in 80 hectares of land between maximum and normal water levels in the southern part of the Keban Dam are investigated on the downstream slope of the Atatürk Dam, the lake area and the Mardin Main Canal. The results to be obtained from the facility mentioned will be guide the works to be undertaken in the use of Solar Energy System for other types of irrigation.

In addition, within the scope of the National Energy Efficiency Action Plan 2017-2023 carried out under the coordination of the Ministry of Energy and Natural Resources, there are 55 actions in 6 categories: buildings and services, energy, transportation, industry and technology, agriculture and horizontal issues. In the Action Plan, the articles regarding the reduction of energy consumption in the Agricultural Sector were defined, and in relation to sector, Action Plan includes actions such as changing old and inefficient tractors and harvesters, increasing energy efficiency in irrigation and promoting renewable energy use, undertaking evaluation works in water products and supporting efficiency improvement projects conducted in agricultural production. By implementing the National Energy Efficiency Action Plan, it is expected that 23.9 million tons of oil equivalent (toe) energy saving will be cumulatively ensured through the investment of 10.9 billion USD by 2023, which is equal to a decrease in primary energy consumption of Türkiye at the rate of 14%. Savings expected to be ensured by 2033 is 30.2 billion USD.

The projects for efficient use of renewable energy resources in agriculture under the efficient use of agricultural water and the protection of water resources are implemented. They are as follows;

a. **Irrigation Canalette with Solar Cell Pilot Project:** With the help of the Project, the need for electricity in agricultural irrigation will be met through solar cell system. As a result of it, the first applicable solar agricultural enterprise will have been established. When they operate, they will irrigate the fields and gardens which are located in approximately 50 ha of area through modern irrigation systems such as sprinkler, dripping, underground dripping and mini sprinkler systems.

b. **Centre Pivot Irrigation System with Solar Cell Project:** It has been aimed to integrate solar cells into the centre pivot which exists under the project. The presence of solar cells will reduce the energy cost spent per the unit area and the use of alternative energy resources in agriculture will be ensured. Also, the adaptation of solar cell system to the centre pivot system which is one of the modern irrigation systems will break new ground.

c. **Increasing Energy Efficiency in Irrigation Pumps Pilot Project:** While the outputs to be obtained from the project reveal the current efficiency of the pumping systems in the research area, recommendations on how to increase the efficiency will also emerge. In the light of the information, the most suitable methods will be identified for regional conditions and an example will be established to ensure the initiation of necessary changes in the pumping systems and emphasize the due importance.

d. **Search of Opportunities to Generate and Use Solar Cell Powered Electrical Energy and Wind Energy System (WES) for Agricultural Irrigation (Case of Eskişehir):** In the project, the performance advantages of the systems between solar energy system (SES) and wind energy system (WES) will be identified under the conditions of Eskişehir, the cost of acquisition of 1 kWh of energy obtained from WES and SES systems will be calculated, the systems will be compared and thus it will be identified which system will pay for itself in how much time in practice, the energy used for the works such as plant irrigation for agricultural enterprises, product drying, product

storage, heating, cooling, lighting etc. will be obtained and electrical energy consumed for agricultural irrigation by the Institute in Eskişehir will be provided and in line with all these results, the most efficient system will be determined for agricultural irrigation under regional conditions and it will be recommended to the farmers.

With Article 4.27 of the 27th meeting of Supreme Council for Science and Technology, the project call on Bringing Solar Energy Technologies to Our Country (MILGES) [2013/204] was published by TUBITAK Public Research Support Group (KAMAG) in 2013. MILGES project implemented by TUBITAK Marmara Research Centre, Middle East Technical University and Bereket Energy (The firm was restructured afterwards and its name became AYDEM Renewable Energy Company) is a project whose customer organizations are Ministry of Energy and Natural Resources Directorate General of Energy Affairs (DGEA) and Ministry of Agriculture and Forestry Directorate General of Agricultural Enterprises (TIGEM), and which is supported under TUBITAK Support Program for Public Sector Research and Development Projects (1007 Program). During the implementation of MILGES project, R&D and Production infrastructures needed for Photovoltaic Solar Power Plants were established. To this end, METU Solar Energy Research and Application Centre "GUNAM Photovoltaic Line (GPVL) " facility was established with the support of MILGES project. At first, PERC type photovoltaic solar cell technologies needed for the project were developed there and they were transferred to Aydem Renewable Energy Company. A photovoltaic cell production facility with a capacity of 130 MW/year was established in Denizli by Aydem Renewable Energy Company for the production of photovoltaic cells. Under MILGES project, Central Solar Inverter with a capacity of 1MW was designed, developed and produced by TUBITAK MRC. Also, SPP SCADA system was developed by TUBITAK MRC. As a project implementation, with the outputs of the project, a solar power plant with a capacity of 6 MW was established and started to operate in Ceylanpınar TIGEM facilities..

6.4. Seed

Increase in agricultural yield depends on the use of quality seed and the studies conducted on seed have a strategic importance for countries. Especially in countries like Türkiye whose agricultural product exports and population have reached a considerable dimension, the importance of seed sector increases rapidly.

Seed sector has become a huge sector with 53 billion USD in the world and it is expected that seed sector will grow by 7.1% between the years of 2018-2023. Market value of hybrid seed in seed sector is 28 billion USD, which is expected to grow by 8.2% by 2023. Türkiye is one of the leading countries in the world seed market.

The data related to the world seed market have been presented in the table. According to that, while the biggest two shares belong to the United States of America and China, Türkiye has a share of 1.7%, which is the same as Italy. On the other hand, grains, oil seed plants, flowers and grass plants are predominantly included in the world seed trade.

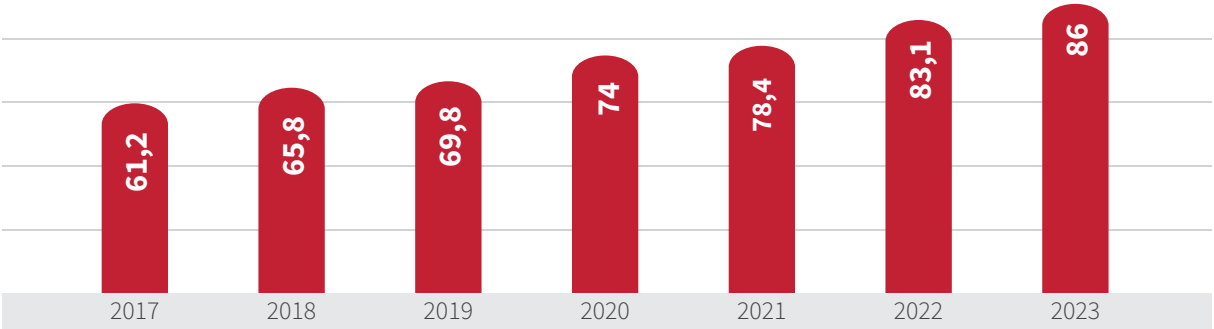


Figure 22. Estimates on Global Seed Market

Source: https://www.statista.com/statistics/262286/global-seeds-market-value/

Statistics provided by International Seed Federation (ISF) are estimates compiled from internal surveys, international trade reports and the information collected during the visits to various countries. In this context, the latest study was conducted in 2017. According to ISF data of world seed trade, it is estimated that it was 11.2 billion USD in 2017 and increased to 12 billion USD in 2019.

It is estimated that, global market value for seed was 62 billion USD in 2017, it was 69 billion USD in 2019 and it will increase to approximately 86 billion USD by 2023.

The Law on Protection of Breeders' Rights for New Plant Varieties in 2004 and Law No. 5553 on Seeds in 2006 entered into force in line with the EU acquis in Türkiye. In addition, with the membership of World Seed Federation (ISF) in 1998 and The International Union for the Protection of New Varieties of Plants (UPOV), global integration promoted private sector entrepreneurship.

In parallel to these developments, activities and expertise areas, the number of commercial species and varieties, employment capacity, use of new production and processing technologies and R&D investments have increased. Also, seed trade, production and use of certified seed have shown a substantial increase. As a result, a substantial increase in quality and efficiency has been observed.

An important study related to seeds is towards the protection and development of genetic resources that exist in the country. Ex-situ conservation studies are conducted by MoAF, General Directorate of Agricultural Research and Policy (DGARP) for the protection, long-term retention and sustainability of plant genetic resources in the country in this field, use of them in scientific research and transfer of them to the next generations. In this context, as of the end of 2020, there are 55,627 seed samples of approximately 3,339 species in the National Seed Gene Bank included in Aegean Agricultural Research Institute and 61,451 seed samples of 1,127 species in the Türkiye Seed Gene Bank included in Central Research Institute of Field Crops. 117,078 seeds in total are retained. Fruit and vine genetic resources which are not possible to keep them as seeds are retained in 18 Land Gene Banks included in MoAF, Research Institutes of DGARP.

With the help of Law on Seeds, a union and 7 sub-unions were established in order to increase yield and quality in vegetative production, ensure the quality assurance of the seeds, make the regulations related to seed production and trade, make the regulations that are necessary for restructuring and development of the seed sector, which helped to organize the sector. With this law, the sector has become an organised structure in the form of a public professional organisation with legal personality. In the framework of Türkiye Seed Growers Association (TÜRKTOB), the sector has been organized in the form of sub-unions according to their working areas. The sub-unions established are as follows: Sub-Union of Seed Industrialists and Producers (TSÜAB), Sub-Union of Plant Breeders (BİSAB), Sub-Union of Sapling Producers (FÜAB), Sub-Union of Seedling Growers (FIDEBIRLIK), Sub-Union of Seed Growers (TYAB), Sub-Union of Seed Distributors (TODAB) and Sub-Union of Ornamental Plant Producers (SUSBIR).

In Türkiye, new plant varieties are protected under the Law No. 5042 of 2004 on Protection of Breeders' Rights for New Plant Varieties. As a result of the fact that this law entered into force in 2004, the number of plant breeding companies based on R&D has substantially increased.

Also, with the Law No. 5977 on Biosafety, the production of agricultural products and seeds that contain GMOs and entry of them into Türkiye have been prohibited.

Türkiye's certified seed production between the years 2002-2020 is indicated in the graph below.

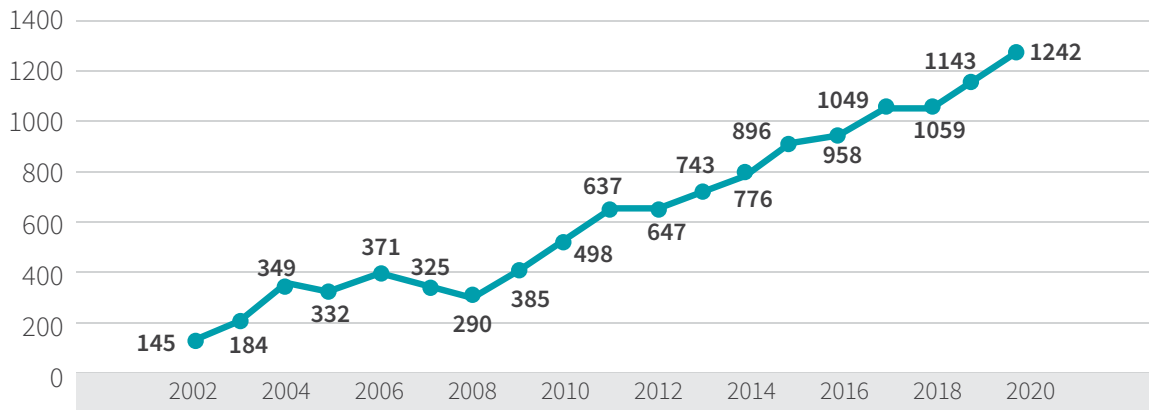


Figure 23. Türkiye's Certified Seed Production (2002-2020) (thousand tons)
Source: Ministry of Agriculture and Forestry

General Directorate of Agricultural Enterprises (TIGEM), which is an associated organisation of MoAF, is an important certified seed producer. It is an important producer in producing respectively common and durum wheat, barley, triticale, common vetch, lentil, clover, sainfoin, chickpea, oat, haricot beans and soybean the most. 768,000 tons of certified seeds are required for 6.9 million hectares of wheat and 3.1 million hectares of barley areas that are cultivated in Türkiye and TIGEM meets approximately 22% of this need.

Türkiye aims to comply with international production standards and trade rules to mobilize its potential in seed sector, make the best of its advantages and have a voice in global seed sector. At this point, Turkish seed sector has a significant advantage in international markets with its production capacity, R&D studies, technical infrastructure, rich biodiversity, ecological advantages and geographical location, cooperation with international organisations and legal infrastructure. Local seed companies of Türkiye have become competitive with the varieties bred by themselves in product groups such as hybrid vegetables, cotton, sunflower, maize etc. As a whole, Turkish seed sector has made a significant progress in terms of technology transfer, capital stock and formation of human resources as a result of cooperation with local and foreign companies.

The quantity of seed production on the basis of some species in Türkiye is presented in the following table. In the 2002-2020 period, the highest increase occurred in lentils, peanuts, chickpeas, dry beans, barley, alfalfa and potato seeds.

Table 67. Seed production (tons)

SPECIES	2002	2005	2010	2016	2017	2018	2019	2020	2002 -2020 Change: (Increase rate %)
Wheat	80,107	176,202	315,676	485,225	508,191	426,658	483,957	500,574	525
Barley	4,376	22,307	34,416	99,628	119,474	151,365	177,306	222,265	4,979
Maize	15,896	30,167	35,234	52,791	58,118	62,230	53,566	68,430	330
Rice	1,293	3,505	5,521	12,958	10,491	10,565	9,886	9,975	671
Sunflower	4,575	6,522	11,854	21,757	28,022	25,028	28,602	33,573	634
Soybean	595	201	1,982	3,664	4,101	3,230	3,960	3,937	562
Peanut	1	101	70	206	197	160	213	232	23,100
Sugar beet	1,421	2,720	466	1,168	1,195	1,818	1,425	1,563	10
Potato	21,375	63,901	70,654	231,592	258,180	276,390	255,966	293,530	1,273
Cotton	11,585	19,581	15,679	14,279	19,929	25,141	26,471	18,533	60
Chickpea	198	157	253	4,059	10,658	31,990	35,643	19,537	9,767
Haricot Bean	29	30		179	624	1,032	3,925	2,156	7,334
Lentil	14	285	107	14,505	12,290	22,011	35,670	36,043	257,350
Canola (rapeseed)	20		107	31	6	9	41	38	90
Vegetable	1,249	1,942	2,500	3,291	3,832	2,042	2,117	2,240	79
Sesame	3		1	18	0	3	0	13	333
Clover	269	476	349	794	887	3,000	3,501	3,456	1,185
Sainfoin	411	1,232	56	188	385	307	773	556	35
Vetch	1,246	2,050	858	1,114	1,139	1,572	1,526	2,487	100
Sorghum	123	160	180	192	79	63	318	159	29
Safflower			397	772	975	361	289	177	
Rutabaga for fodder		5		53	6	11	19	27	
Beet for fodder	22	10	26	36	31	10	1	0	-100
Grass plant and timothy grass	406	636	56	107	167	404	366	1,255	209
Fodder peas			40	1,585	2,321	2,121	3,656	5,420	
Others	13		1,483	7,734	8,067	11,795	14,269	16,152	124,146
TOTAL	145,227	332,190	497,964	957,925	1,049,366	1,059,316	1,143,466	1,242,328	755

Source: Ministry of Agriculture and Forestry

The share of private sector has increased substantially in seed production and as of 2020, its share is 85% in seed production.

On the other hand, it is critically important to choose the right variety and use quality seedling for a successful vegetative production. Almost all of the seedlings which are especially grown through greenhouse farming are produced in modern production facilities. In vegetative production in Türkiye until the mid-1990s, seedling production was conducted mostly by seedling growers in their own limits. The first modern seedling production facilities were established in Antalya in 1994. Due to the difficulty of traditional seedling production, the demand for seedlings-ready-to-plant which are grown under controlled conditions has started to increase. Every passing year, the number of producers who use these seedlings that provide high yield and quality product and utilization of seedlings-ready-to-plant increases. Accordingly, enterprises increase their capacities and they make significant contributions to the improvement of seedling sector. With the help of the technologies used in recent years, grafting has also become possible in seedlings-ready-to-plant sector. In Türkiye, there are not many breeding programs regarding rootstock breeding that is used for producing seedlings. However, rootstock breeding programmes have been initiated by some private sector organisations and agricultural research institutes lately.

While grafted seedling production predominantly focused on tomato seedling in the first years, it has reached a significant dimension in the production and use of grafted watermelon seedlings in recent years. Strawberry seedling, fruit and vine certified sapling production has substantially increased since 2002. In 2002, with 4.5 million strawberry seedlings, certified sapling production increased approximately 48 times, to 192 million in 2020.

Ornamental plant production has also substantially increased since 2002. Data on production areas and production quantity of ornamental plants are presented in the following table.

Table 68. Production Area (ha) and Quantity of Production (million units) of Ornamental Plants

Product Group	2002	2015	2016	2017	2018	2019 (ha)	2020 (ha)	2002-2020 (% Change)	2015 (million units)	2016 (million units)	2017 (million units)	2018 (million units)	2019 (million units)	2020 (million units)	2015-2020 (% Change)
Cut Flowers	10,097	11,826	12,014	11,748	11,920	12,374	12,682	25,6	1,036	1,041	1,051	1,056	1,093	1,083	4.5
Indoor Ornamental Plants	800	1,465	1,313	1,651	2,082	1,992	1,706	113.3	41	38	56	60	52	48	17.1
Outdoor Ornamental Plants	8,017	32,293	34,877	36,263	37,306	37,699	39,739	395.7	451	409	491	507	510	529	17.3
Flower Bulbs	256	613	597	427	493	412	498	94.5	27	25	22	89	63	71	163.0
Total	19,170	46,197	48,801	50,089	51,801	52,477	54,625	185.0	1,555	1,513	1,620	1,712	1,718	1,731	11.3

Source: Ministry of Agriculture and Forestry

96% of the seedlings and saplings that are used for fruit growing are produced and certified in Türkiye. Fruit growing sector in Türkiye, which uses approximately 10% of agricultural areas and produces 15.3 million tons of fruit, is an important sector with a high competition potential which has a share of 2.3% in world production. As a result of supports, important investments in installation of commercial fruit orchard have been made recently and investments in modern fruit orchards increase every day.

Arboriculture sector has an important role in international standards, seed growing sector with 119,8 million-unit annual production for the year 2020 and vegetative production of Türkiye and it is a business sector with its imports value which corresponds to 3.3 million USD and its exports value which corresponds to 32.4 million USD.

While sapling production in Türkiye was 3.5 million in 2002, 100.9 million certified saplings were produced in 2020. With its registered sapling production which has increased 34 times, as a self-sufficient country, Türkiye exports 40% of its production.

6.5. Plant Production Products (Agrochemicals)

Another important input in agricultural production is plant protection products. Plant protection products as included in Law No. 5996 are active substances and preparations presented to the user in a formulation containing one or more active ingredients to destroy unwanted plants or parts of plants, control or prevent undesired plant growth. They protect plants and herbal products against harmful organisms or prevent the impacts of these organisms, affect plant development other than those intended for plant nutrition and they are not covered by a special regulation on preservatives, but they are used as preservatives for herbal products.

It is inevitable to combat harmful organisms that cause problems in agricultural production. When plant protection practices are not duly implemented, not only product losses but also quality losses will be encountered, which will lead to significant losses on both producer and national economy, and in case of large-scale losses, even the food supply may be threatened. According to the data of Food and Agriculture Organization of the United Nations (UN-FAO), the product loss resulting from annual harmful organisms and diseases is approximately 40%. According to the assessments of different researchers, it is stated that these losses may double if plant protection products are not used.

Chemical combat in plant health activities, i.e., the combat using plant protection products is the most preferred method due to the fact that the impact of these products is observed in a short time and easily by producers, they can be applied to more than one harmful organisms at the same time, they are easily applicable, accessible and affordable and they do not need too much labour.

Transactions on licensing, production, import, use, packaging, labelling, promotion, shipping, storage, prescribed and unprescribed sale and control of plant protection products in Türkiye are conducted by GDFC according to the provisions of the "Law No. 5996 on Veterinary Services, Plant Health, Food and Feed". Acts and actions on these products are regulated by the regulations enacted based on the Law No.5996.

In the licensing process, plant protection products are assessed by considering toxicology, ecotoxicology, biological effectiveness, physical and chemical features and their licensing status in the world. The licensing is conducted when it is officially approved by competent bodies.

It is not possible to license and use a plant protection product which has been prohibited or restricted in the world. Also, the production and imports of prohibited plant protection products due to their toxicology are not allowed in Türkiye. Preparations that are assessed and licensed as plant protection products are pesticides, plant growth regulators (PGRs), attractants, repellents, insect growth regulators (IGRs), antinutrients, biopreparations, plant activators, substances that are used for the treatment of physiological diseases, biological combat factors, traps and pheromones. Product groups in the context of pesticides are acaricides, insecticides, fungicides, herbicides, rodenticides, molluscicides, plant activators, plant growth regulators, attractants, fumigants and nematicides. Trial and licensing principles on the subjects that are defined as plant protection products but not assessed according to principles stated in the legislation are separately determined by the Ministry. According to TURKSTAT data, 45,476 tons of pesticides were used in 2006 and 51,297 tons of pesticides have been used since 2019.

6.6. Agricultural Equipment and Machinery

Statistics related to agricultural equipment and machinery in Türkiye are presented in the following table. According to that, the highest increase has been observed in the number of milking machine installations and milking machines and the highest increase in vegetative production has been observed in the number of fertilizer distribution machine (97.82%), sowing machine (73.37%) and tractor (71.48%)

Table 69. Statistics of Agricultural Tools and Machinery

Years	Agricultural tools and machinery: Plough	Agricultural tools and machinery: Sowing machine	Agricultural tools and machinery: Fertilizer Distribution Machine	Agricultural tools and machinery: Water pump	Agricultural tools and machinery: Milking machine installation	Agricultural tools and machinery: Portable milking machine	Agricultural tools and machinery: Harvester	Agricultural tools and machinery: Tractor
1995	1344188	271152	219285	464806	1402	34191	12706	776863
2000	1355813	319648	297294	513537	6093	83802	12578	941835
2005	1354383	343200	328515	554672	5571	130087	11811	1022365
2010	1364033	392751	369063	607490	7280	208457	13799	1096683
2015	1360830	442607	403541	683056	9744	292405	15998	1260358
2018	1378985	470085	433791	721516	12856	332595	17266	1332139
2019	1384708	479894	440312	731862	13178	342386	17190	1354912
% Change between 1995-2019	3.01	76.98	100.79	57.46	839.94	901.39	35.29	74.41

Source: TURKSTAT

According to the data of the Ministry of Trade[74], our exports have shown a substantial trend of increase by years. The exports of agricultural tools and machinery which were worth 14 million USD in 2000 increased to 135 million USD in 2010 and reached 940 million USD in 2019 with an increase of 18.6% compared to the previous year. 21.7% of agricultural tools and machinery are exported to the United States of America and 53% of them are exported to Italy, Iraq, Azerbaijan and Uzbekistan. While the share of the first 10 countries in our exports is 64%, the share of the first 20 countries is 77%. The imports of agricultural tools and machinery were 57.6 million USD in 2000 and 239 million USD in 2010 and decreased to 209.7 million USD in 2019 with a decrease of 55% compared to the previous year. 20% of agricultural tools and machinery are imported from Germany and 62% of them are imported from Germany, Italy, France, China and the United States of America. While the share of the first 10 countries in our imports is 87%, the share of the first 20 countries is 98%.

According to TZOB, the purchasing power of farmers plays a major role in the development of agricultural mechanization. Among the agricultural input items, the most expensive one is mechanization. In this regard, while Türkiye attaches importance to technology and innovation transfer, it supports agricultural R&D activities. Recently, studies have been initiated in Türkiye under the leadership of the MoAF for the production and commercialization of electric tractor. Testing related to these studies is ongoing.

6.7. Labour Force

Employment, unemployment and labour force participation rates are important indicators that provide insight about the level of welfare, labour resource and potential of the countries and contribution of the sectors to the national income. Employment is also a sociologically important indicator and strongly associated with social security services.

Agriculture provides large-scale employment opportunities for people living in rural areas in underdeveloped and developing countries[75]. According to ILO (2019), the share of agriculture in total employment is shrinking in all country income groups. On a global scale, the share of agriculture in total employment declined from 44% in 1991 to 28% in 2018, with the largest contribution that may be attributed to the middle-income group. In low-income countries, according to the 2018 data, 63% of employees are currently employed in the agricultural sector. Furthermore, this rate has decreased by only

74 https://ticaret.gov.tr/data/5b87000813b8761450e18d7b/Tarim_Alet_ve_Makinalari.pdf
75 https://www.ippmedia.com/en/features/importance-agricultural-sector-country%E2%80%99s-economic-development. Accessed: 09.09.2019.

8% since 1991. In the table, agricultural employment rates of the period of 1991 and 2017 have been comparatively presented by country income groups.

Table 70. Change in Agricultural Employment in 1991 and 2018 by Country Income Groups, %.

Country Income Group	1991	2018
Low Income Group	71	63
Lower-middle Income Group	57	40
Upper-middle Income Group	49	22
High Income Group	6	3

Source: ILO, 2019

According to ILOSTAT data compiled by World Bank, key indicators related to agricultural employment have been presented in the table for 1991 and 2018 period across the world and Türkiye[76].

Table 71. Basic Labour Indicators across the World and Türkiye

Indicators	World			Türkiye		
	1991	2018	2019	1991	2018	2019
The Share of Agriculture in Total Employment, %	43.699	27.220	26.757	29.760	18.430	18.110
Employment in Agricultural Sector, Men, %	44.303	28.141	27.685	20.980	14.860	14.850
Employment in Agricultural Sector, Women, %	42.765	27.780	25.313	49.120	26.030	25.050

Source: World Bank Database

According to World Bank data, the rate of agricultural employment in terms of labour share was 47.8% of total employment in Türkiye in 1991, which indicates people of working age who are involved in any activity in the agricultural sector to produce the goods or provide service for profit or payment purposes in the agricultural sector, and this rate decreased to 18.2% in 2019. The total number of people who have been employed at national level since 2020 is approximately 27 million. 17.6% of people employed in total employment rate (4,716,000 people) are involved in the agricultural sector. Among the economic activities, agriculture is one of the important sectors. The rate of 17.6% is well below the world average. In Türkiye, agricultural employment is shifting towards manufacturing industry and services in connection with the development level of the country.

According to TURKSTAT data, the reasons why the ones at 15+ age group who are not involved in labour force are not included by years are presented in the table.

6.8. Feed

Our need for fodder plant seed, which is an important input in livestock, the quantity of production and the ratio of production to supply according to the 2017 data are presented in the following table.

Table 72. Production Volume and Supply-Demand Ratio

Product	Seed demand (tons)	Production quantity of certified seed (tons) (2019)	The Ratio of Production to Supply (%)
Clover	3,206	3,501	109.2
Sainfoin	4,674	773	16.5
Vetch	35,235	1,526	4.3

Source: DGAE 2019 Seed Sector Report

76 https://data.worldbank.org/indicator/SL.AGR.EMPL.MA.ZS. Accessed: 09.08.2019

Out of domestic certified seed production quantity;

- 80% of clover,
- 55% of sainfoin seeds,
- 92% of vetch seeds were registered by our institutes and TIGEM

Production costs of compound feed used in livestock are presented in the table.

Table 73. Production Quantity of Compound Feed (Years of 2010-2020) (tons/Year)

Years	Cattle Fattening Feed	Cattle Milk Feed	Broiler Feed	Egg Feed	Other Compound Feeds**	Total
2010	2,169,487	3,466,422	3,453,846	820,753	1,257,022	11,167,530
2011	2,686,728	3,875,836	4,141,768	953,819	1,504,190	13,162,340
2012	2,881,354	4,365,168	4,224,111	1,058,733	1,959,173	14,488,539
2013	2,846,217	5,163,788	4,083,687	1,602,364	2,265,811	15,961,867
2014	3,386,565	5,621,664	3,979,945	2,480,547	2,534,895	18,003,616
2015	3,320,221	5,384,586	4,779,916	3,417,209	3,203,051	20,104,983
2016	3,827,073	5,840,262	4,566,237	2,958,232	3,210,048	20,401,852
2017	4,594,552	6,171,275	4,753,989	3,369,655	3,528,862	22,418,333
2018	5,072,549	6,481,999	5,306,118	3,600,843	3,682,980	24,144,489
2019	5,406,167	6,550,258	5,363,210	3,828,441	3,791,041	24,939,117
2020	5,732,941	7,016,824	5,397,526	3,716,754	4,408,221	26,272,266

***Other Feeds: Small livestock feeds, fish feeds, horse feed, feeds for domestic and ornamental animals, bee cakes etc.*

As stated by Turkish Poultry Meat Producers and Breeders Association (BESD-BIR), feed input in poultry breeding for meat accounts for almost 70% of the cost. A considerable quantity of maize (50%), soybean, vitamins, minerals and enzymes are used in feed content. While sufficient quantity of maize is produced, the need for maize is met at self-sufficient level, the use of rendering products (such as poultry by-products-feather/blood meal) which is not available for consumption but can be used in slaughterhouses as a protein source in feed has been prohibited. Feed additives used in feed (enzymes, vitamins and minerals) are often imported. Technical service in poultry production is generally provided by the veterinary surgeon of integrated company. In addition, foreign consultants of foreign product supplier companies may also provide training. There is a sufficient number of academicians/staff specialized in their fields in our country. Veterinary medicines and vaccines are subject to external dependence. Considering the status of the poultry health in our country, it is possible to produce medicine and vaccines domestically.

In aquaculture (including inland water), approximately 50% of the need for fish flour used for feed production is imported from overseas.

7

FOOD-PROCESSING INDUSTRY

long-term existence. One of the priorities of the MoAF is to conduct the studies on the promotion of sustainable practices in order to protect natural resources. Also, MoAF strengthens and scales up the R&D studies of the industry in relation to environment, contributes to the development of important environmental policies such as sustainable production and consumption, energy, climate change, water, waste and resource management and encourages the practices in which resources are efficiently used at all the stages of food chain such as agriculture, production, retail and consumption.

According to the 2019 data of the UN Trade Map, the export share of Türkiye in the global food and food-oriented agricultural product sector is 1.1% and it ranks 26th in the world.

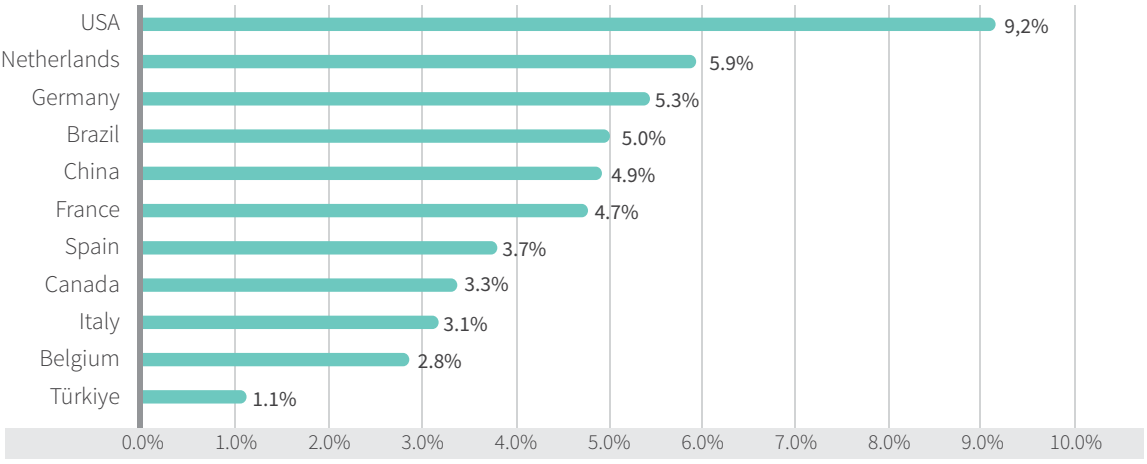


Figure 24. Exports in the Global Food and Beverages Sector (%)
Source: Ministry of Industry and Technology, 2020

As seen in the table, the world leader in food-oriented agricultural production is China. China is followed by Venezuela, India, the United States of America. Türkiye ranks 10th in the agricultural production for food.

Table 74. Top 10 Countries in Agricultural Production for Food in the World

Countries	Agricultural Production Value for Food (billion $)
China	1,181
Venezuela	675
India	340
USA	320
Brazil	153
Indonesia	134
Japan	86
Russia	70
France	65
Türkiye	64

Source: Ministry of Industry and Technology, 2019

Türkiye proceeds to become a more active player in the global food and beverages market every passing year. Turkish food and beverages sector constitutes one of the most attractive areas for foreign investors. According to that, a total of 150,136 million USD of foreign investment was made in Türkiye in 2019.

Table 75. Distribution of Foreign Direct Investments by Some Sectors in Türkiye (million USD)

	2010	2011	2012	2013	2014	2015	2016	2017	2019
AGRICULTURAL SECTOR	**524**	**523**	**769**	**807**	**1,067**	**777**	**730**	**1,354**	**523**
Agriculture, Hunting and Forestry	524	523	769	807	1,067	777	730	1,354	523
INDUSTRIAL SECTORS	**66,112**	**55,268**	**80,990**	**63,054**	**78,582**	**66,427**	**56,228**	**80,296**	**46,603**
Mining and Quarrying	3,433	2,575	5,292	3,498	3,620	2,734	2,185	4,622	3,170
Manufacturing	46,953	34,311	51,953	46,525	57,813	48,836	42,781	57,552	35,449
Manufacturing of Food, Beverage and Tobacco Products	11,500	7,881	14,505	11,160	12,309	10,974	9,496	11,631	7,354
Electricity, Gas, Steam and Acclimatization Production and Distribution	15,363	18,149	23,398	12,946	17,063	14,803	11,208	18,070	7,977
Water Supply, Sewer, Waste Management and Improvement Activities	363	233	347	85	86	54	54	52	7
SERVICES SECTOR	**114,535**	**75,121**	**102,008**	**79,614**	**95,153**	**80,383**	**79,477**	**101,071**	**103,010**
TOTAL	**181,171**	**130,912**	**183,767**	**143,475**	**174,802**	**147,587**	**136,435**	**182,721**	**150,136**

Source: The Central Bank of the Republic of Türkiye

According to the data of Ministry of Agriculture and Forestry[77], there are a total of 711,743 food holdings in Türkiye in the context of registration and approval. 13,281 of them are in the scope of approval and 698,462 of them is in the scope of registration. The number of food holdings is presented in the table.

Table 76. The Number of Food Holdings (As of 25.01.2021)

Enterprises in the Scope of Approval	Number of Approved Enterprises
Dairy Processing Facility	2,402
Milk Collection Centre	6,221
Red Meat Slaughterhouse	489
Poultry Meat Slaughterhouse	63
Meat Chopping and Processing Facility	2,177
Water Products	257
Animal By-product (Enterprises that Produce Processed Bladder, Intestine and Tripe)	160
Egg and Its Products	1,512
Total	13,281
Enterprises in the Scope of Registration	**Number of Registered Enterprises**
Production Site	79,880
Selling Place	335,795
Collective Consumption Place	282,677
Total	698,462

Source: Ministry of Agriculture and Forestry

77 https://www.tarimorman.gov.tr/sgb/Belgeler/SagMenuVeriler/GKGM.pdf

7.1. Production Trends in the Sector and Main Products Produced

In recent years, the developments in seed growing and organic agriculture have been awaiting entrepreneurs as serious investment areas. Organic agriculture is developing in a rapid manner in the world. Türkiye is the 6th country exporting organic products to European countries with 210,760 tons, according to FOAM 2021 data.

The consumption of grain and grain products ranks 1st across Türkiye. Vegetable consumption ranks 2nd, following the consumption of grain group. The most consumed dairy products are yoghurt and various cheeses. In addition, the potential of "halal food" production provides important opportunities for Türkiye whose population is mostly Muslim. According to GIMDES, the potential of halal food demand of Islamic world with 2 billion population in the world is 860 billion USD. However, only 14% of it can be met.[78]

In relation to the subject, Halal Accreditation Agency with special budget which possesses public legal personality, administrative and financial autonomy was established to accredit halal conformity assessment bodies, ensure that these bodies operate in accordance with national or international standards and thus ensure the national and international acceptance of their issued documents under the Law No. 7060 in 2017.

7.2. Regional Structure of the Sector and Clustering

"Regulation on Clustering Support Program" was published on Official Gazette by the Ministry of Industry and Technology to support clustering initiatives which have the potential of sustainability and have importance at national level, and which operate predominantly in the manufacturing industry in order to accelerate the transformation of Turkish industry into an industrial structure that has a bigger share in the world trade, mostly produces high technology products, has a qualified labour force, sensitive to environment and the community by increasing the competitiveness and efficiency of Turkish industry. The food sector is also among the sectors supported in this context.

SMEs on food and beverages sector are available almost everywhere in Türkiye. It has been observed that regional clustering in food and beverages sector is concentrated in Marmara, Aegean, Anatolia and Mediterranean Regions respectively. When examined on a provincial basis, it has been identified that the enterprises for the manufacturing of food and beverage products have gained importance in İstanbul, Gaziantep, Ankara and Bursa. İşletme sayısı = Number of enterprises.

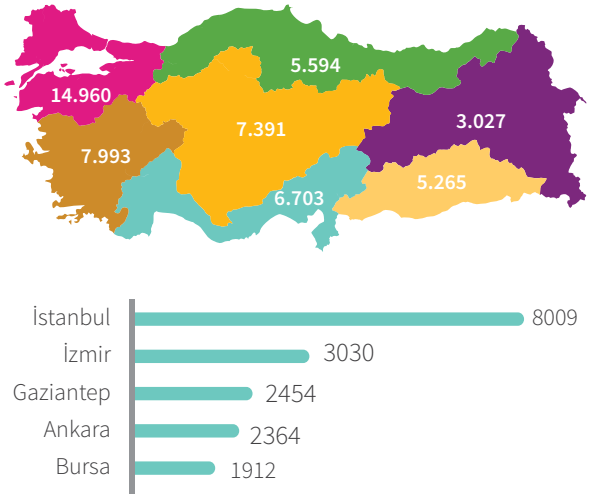


Figure 25. The Number of Food and Beverages Companies according to the Regions and the Provinces with the Highest Number of Enterprises
Source: Enterprise Information System 2021

78 http://www.gimdes.org/, accessed:

7.3. Number of Businesses and Employment in the Sector

As seen in the following table, according to the 2018 records of SSI, 466,144 out of 14,314,313 registered employees are engaged in the manufacturing of food products and 15,827 of them are engaged in the manufacturing of the beverages.

Table 77. The Number of Businesses and Employment in the Sector

	2013		2014		2015		2016		2017		2019		2013-2019 Change (%100)	
SECTOR	Businesses	Employment	Businesses	Employment	Businesses	Employment	Businesses	Employment	Businesses	Employment	Businesses	Employment	Businesses	Employment
Manufacturing of good products	41,661	417,671	41,657	434,180	41,975	441,794	41,896	434,823	42,846	446,064	45,097	466,144	8.25	11.61
Manufacturing of bevarages	640	13,727	641	14,523	648	15,104	658	14,695	665	15,624	681	15,827	6.41	15.30

Source: SSI (2019)

The number of businesses in food sector which was 41,611 in 2013 increased to 45,097 in 2019, which corresponds to an increase of 8.3%. Considering employment in food sector, it is observed that 417,671 employees worked in the sector in 2013 and it increased to 466,144 in 2019, which corresponds to an increase of approximately 11.6%.

In 2013, 640 businesses operated in beverage sector and it increased to 681 in 2019, which corresponds to an increase of approximately 6.2%. The number of employees in beverage sector was 13,727 in 2013 and reached 15,827 in 2019, which corresponds to an increase of 15.3%.

TURKSTAT Employment Index decreased by 0.05 point in the food product manufacturing sector and decreased by approximately 0.63 point in beverage manufacturing sector in 2019 compared to the previous year.

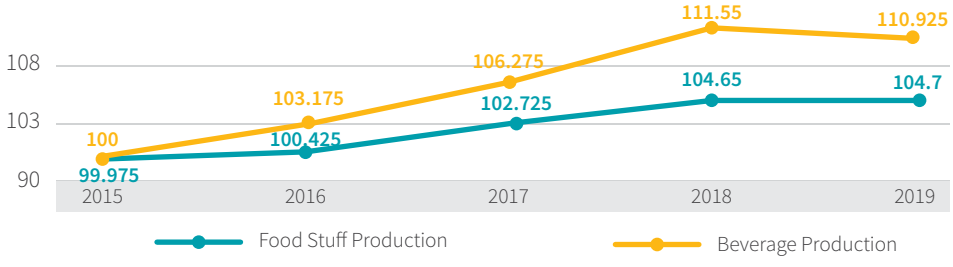


Figure 26. Employment Index Annual Average
Source: TURKSTAT (2019), 2015=100

7.4. Added Value in Food and Beverages Sector

According to Food and Beverages Sector Report (2020) published by the Ministry of Industry and Technology, the businesses that operate in food industry have produced the highest added value among all the manufacturing industry sectors.

Total added value of food and beverages sector was 13.04 billion TRY in 2010 and it was 39.3 billion TRY in 2017, which corresponds to an increase of approximately 200% (TURKSTAT). Manufacturing of food products Manufacturing of textile products Main metal industry.

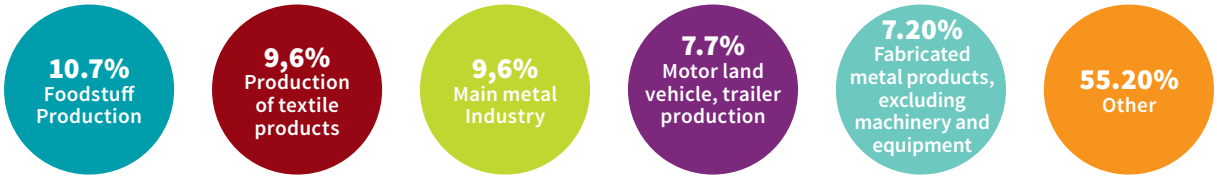


Figure 27. Graph on Distribution of Added Value by Sectors (2017)
Source: TURKSTAT and Ministry of Industry and Technology, 2020

Food and beverages sector has shown a regular increase in turnover index each year and maintained its positive trend.

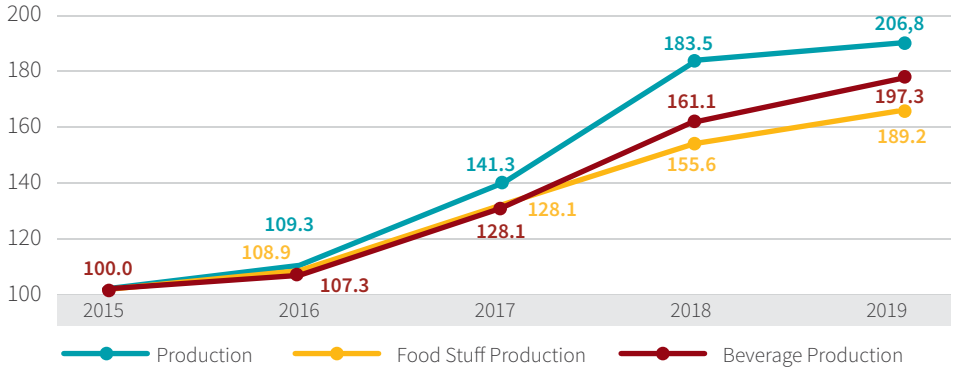


Figure 28. Turnover Index of the Sector
Source: TURKSTAT and Ministry of Industry and Technology, 2020

7.5. R&D Activities of the Sector

Food is the basic need for human life and is critically important for public health, which has made food production-consumption chain one of the most important subjects today. Therefore, in the food industry, it carries utmost importance to develop R&D, technology development and innovation-oriented studies in which all the production-consumption chain is included and support pilot projects.

According to TURKSTAT data, R&D expenditure on food and beverages sector was 243.7 million TRY in total in 2017 and it was 351.8 million TRY in 2018. There was an increase in R&D expenditures of the manufacturing industry and the sector in 2018 compared to the previous year. The share of the sector in R&D expenditures of the manufacturing industry was 2.56% in 2018, which increased compared to the previous year.[79]

79 Ministry of Industry and Technology, 2020

7.6. Foreign Trade of the Sector

Türkiye ranks 25th major exporter of the world in food and beverages sector (UN Comtrade, BEC, 2018).

While Türkiye experienced a decrease in the exports of food and beverages sector in 2016 due to political issues encountered in the region, the trend was positive again in 2017. In 2019, the sector's exports totalled 12.8 billion USD. The share of sector's exports in total exports was 7.5% in 2019. In 2019, total exports were approximately 171.5 billion USD in our country.

As seen in the Figure 30, the exports of food and beverages sector were 12.8 billion USD and the imports were 5.2 billion USD and foreign trade balance was 7.6 billion USD.[80]

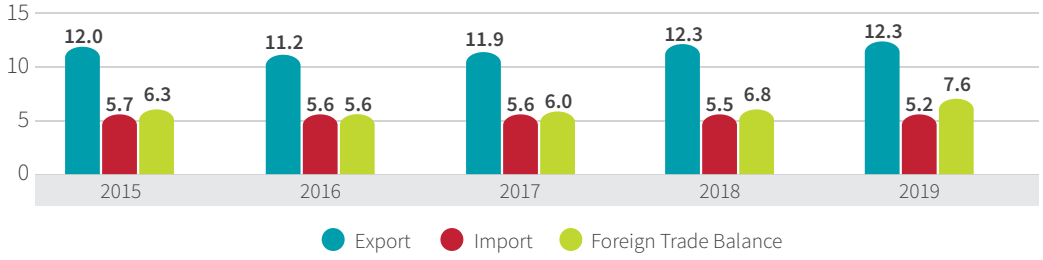


Figure 29. Foreign Trade of Food and Beverages Sector in Türkiye
Source: TURKSTAT and Ministry of Industry and Technology, 2020

Food industry in Türkiye attracts attention as an industry branch that has net foreign trade surplus. In this context, the sector can adapt to rising consumption patterns in the world economy, crises and changes, changing domestic supply and demand conditions and it has short and long-term strategies, which contributes to growth-based development of the sector.

80 (Sanayi ve Teknoloji Bakanlığı, 2020)

8

ECONOMIC DEVELOPMENTS IN AGRICULTURE AND KEY INDICATORS

Since the history of humanity, agriculture has been the most important and primary sector affecting the course of economy. Agricultural sector may be considered as the first step in the development processes of developing countries. In the historical process, the production and trade of agricultural products have also become widespread along with the world population.

8.1. Gross Domestic Product and Gross Added Value

In the early years when the republic was established, the share of agriculture in GDP was around 43%. This ratio decreased over time and the share of agriculture in GDP has not changed significantly since 2009. It became 7.13% in 2019. GDP and Gross Added Value have a trend of increase. According to TURKSTAT data, GDP was 277,494,885,000 TRY and Gross Added Value was 3,891,943,504,000 TRY in 2019. Growth rate of agriculture was higher than growth rate of Türkiye in 2019. Today, Türkiye ranks 1st in Europe and 7th in the world in terms of agricultural products. Economic crises play a leading role between the reasons of change in growth rates.

Table 78. Gross Domestic Product in Agriculture and Türkiye (2009=100)

Years	Gross Domestic Product, Volume, Index and Changes according to economic activities (A21) Agriculture, forestry and fisheries		Share of Agriculture in Total GDP	Gross Domestic Product at Current Prices (Based on 2009): Gross Added Value (1000 TRY)	Gross Domestic Product at Current Prices (Based on 2009): Gross Domestic Product (1000 TRY)	Total Development Rate (%)
	Volume (1000 TRY)	Change (%)				
2009	81234274	4.1	9.12	891,082,431	999,191,848	-4.7
2010	87464906	7.7	10.27	1,019,910,553	1,160,013,978	8.5
2011	90473489	3.4	9.36	1,226,695,865	1,394,477,166	11.1
2012	92459744	2.2	8.78	1,385,412,768	1,569,672,115	4.8
2013	94649299	2.4	7.68	1,585,325,082	1,809,713,087	8.5
2014	95167987	0.5	7.45	1,808,189,955	2,044,465,876	5.2
2015	103977399	9.3	7.83	2,060,726,790	2,338,647,494	6.1
2016	101280685	-2.6	7.02	2,298,896,464	2,608,525,749	3.2
2017	106262848	4.9	6.86	2,756,755,249	3,110,650,155	7.5
2018	108504357	2.1	6.44	3,369,140,914	3,758,315,621	2.8
2019	112560772	3.7	7.13	3,891,943,504	4,320,191,227	0.9

Source: TURKSTAT

Thanks to its rich geographical and climatic conditions, Türkiye produces agricultural products ranging from field crops such as grains, oil seeds to various horticultural plants such as fruits, vegetables. Türkiye also plays an important role in livestock and animal production. Agricultural sector which has a strategic importance is a socio-economic sector.

However, it is important to protect and develop the existing product range, increase the quantity of products and production efficiency, improve the food systems at local and national level in a sustainable manner, strengthen the economic development and develop preventive measures, mainly family businesses and small-scale enterprises in the agricultural sector, improve fair living conditions, increase the number of products with geographical indications by protecting local values.

8.2. Geographical Indications

As defined by Türkpatent, "geographical indication is a quality indication that shows and guarantees the source and characteristic features of the product and the connection between characteristic features of the product and geographical area for consumers. With the geographical indication registration, the products which have earned reputation based on its quality, traditionality, raw material obtained from the region and local qualifications are protected. Geographical indications are registered as designation of origin or mark of origin".[82] Geographical indications in Türkiye are safeguarded under the Law No. 6769 on Industrial Property and they are categorized under three items as (i) Protection of Designations of Origin, (ii) Protection of Geographical Indicator, (iii) Protection of Traditional Species. The main aim of protecting geographical indications through the law is to prevent them from being used by the unauthorized parties and prevent consumers from being deceived on the origin of the product.

Registration procedure of the products according to geographical indicators is implemented by the Turkish Patent and Trademark Office (Türkpatent) and special usage and compliance of geographical indications on food and agriculture or traditional product names set out in application documents are assessed by the Ministry of Agriculture and Forestry in accordance with the Law on Veterinary Services, Plant Health, Food and Feed.

As of 25 March 2020, 688 products have been registered with national geographical indication. The total number of applications whose transactions are ongoing is 723. 548 of them are food and agricultural products. Application process is ongoing for 628 products. The Ministry of Agriculture and Forestry implements a project on raising awareness about Geographical Indications for the 2017-2021 period. Main project activities are to increase collective outcomes of producers and interests of producer organizations, define the products that may be registered in the EU, cooperate with relevant structures and organizations under the EU Geographical Indications Strategy Document and Action Plan.

As included in the "European Union, International Organizations and Conventions"[83], pursuant to EU Regulation No 1151/2012, non-member countries defined as "third countries" have the right to apply for registration and file an appeal against applications published by the Commission. In this framework, "Antep Baklavası" as a geographical indication, "Aydın İnciri" as designation of origin, "Malatya Kayısısı" as a designation of origin, "Aydın Kestanesi" as designation of origin, "Taşköprü Sarımsağı" as a designation of origin, "Milas Zeytinyağı" as a designation of origin, and "Bayramiç Beyazı" as a designation of origin, were registered and put under protection in the presence of EU. Registration application was also made for 24 products. The products for which registration application was made are; Aydın Memecik Olive Oil, İpsala Rice, Afyon Pastrami, Afyon Sausage, İnegöl Meatballs, Kayseri Sausage, Kayseri Pastrami, Kayseri Ravioli, Antep Pistachio, Antep Lahmacun, Edremit Bay Green Scratched Olives, Giresun Chubby Hazelnut, Antakya Kunafe, Maraş Çöreği, Çağlayancerit Walnut, Maraş Tarhana, Gemlik Olives, Milas Oil Olive, Gaziantep Menengiç Coffee/ Gaziantep Melengiç Coffee, Araban Garlic, Tonya Butter, Erzurum Water Pastry, Edremit Olive Oil and Antep Pistachio Paste, Aydın Memecik Olive Oil and İpsala Rice.

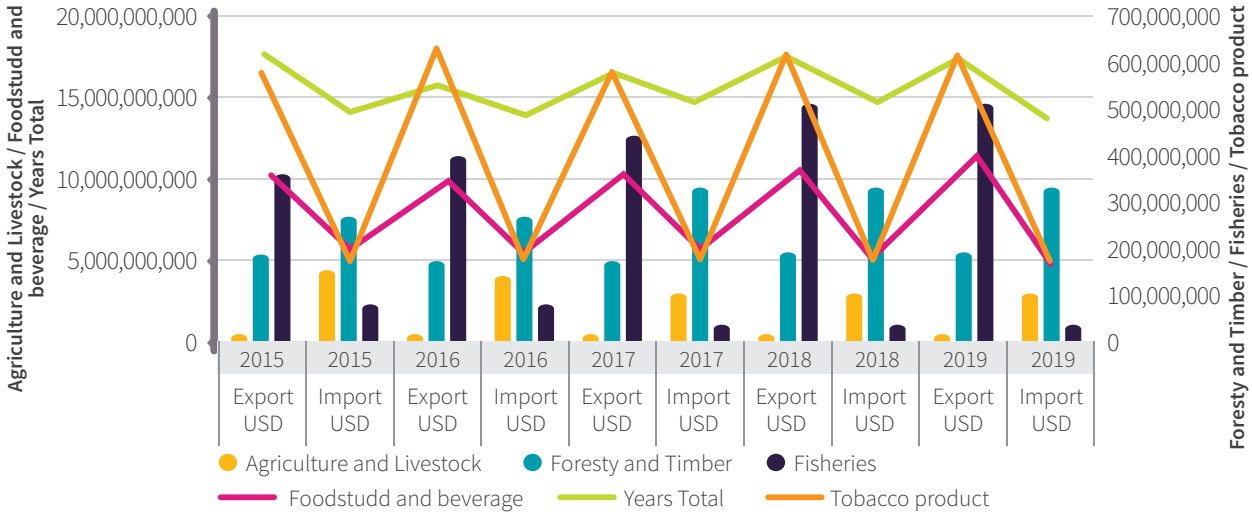
Foreign Trade Data

Türkiye's total exports were 171,464,944,593 USD and its total imports were 202,704,319,533 USD in 2019. Türkiye's total exports were 160,689,022,354 USD and its total imports were 209,530,914,663 USD in 2020. The exports and imports data of 2019 are shared in the table. The share of agriculture and forestry sector in total exports was 3.22% and the share of agriculture and forestry sector in imports was 4.67% in 2019.

82 https://www.ci.gov.tr/sayfa/co%C4%9Frafi-i%C5%9Faret-nedir
83 https://www.tarimorman.gov.tr/ABDGM/Belgeler/Uluslararas%C4%B1%20Kurulu%C5%9Flar/AVRUPA%20B%C4%B0RL%C4%B0%C4%9E%C4%B0,%20ULUSLARARASI%20KURULU%C5%9ELAR,%20S%C3%96ZLE%C5%9EMELER.pdf

Table 79. Türkiye's Foreign Trade (2019)

ISIC	ISIC name	Exports (USD)	Share (%)	Imports (USD)	Share %
A	Agriculture and Forestry	5,515,506,987	3.22	9,466,458,333	4.67
B	Fisheries	517,101,513	0.30	52,392,986	0.03
C	Mining and quarrying	3,194,714,613	1.86	31,747,903,110	15.66
D	Manufacturing industry	161,552,341,586	94.22	154,254,057,288	76.10
E	Electricity, gas and water	104,451,913	0.06	40,606,430	0.02
G	Wholesale and retail trade	563,484,614	0.33	7,091,337,673	3.50
K	Immovable property, leasing and business activities	680,690	0.00	441,367	0.00
O	Other social and personal services	16,662,677	0.01	51,122,346	0.03
Years Total		**171,464,944,593**	**100.00**	**202,704,319,533**	**100.00**



Source: TURKSTAT

Table 80. Foreign Trade of Agricultural and Food Products in Türkiye at ISIC 3rd Level (TURKSTAT)

ISIC	ISIC name	2015		2016		2017		2018		2019	
		Exports (USD)	Import USD	Export USD	Import USD	Export USD	Import USD	Export USD	Import USD	Export USD	Import USD
11	Herbal products, orchard, fruit and vegetables	5,397,752,352	6,654,218,643	5,036,124,394	6,269,748,572	4,821,319,331	7,612,944,616	5,003,309,678	7,344,253,274	5,068,973,149	8,616,515,128
12	Livestock	337,870,128	382,268,842	336,711,331	655,702,413	439,275,434	1,282,395,200	519,193,225	1,850,883,515	409,771,352	770,919,588
20	Forestry and Timber	20,973,601	139,842,622	24,413,551	115,916,715	26,542,187	91,415,104	33,830,148	88,954,098	36,762,486	79,023,617
50	Fisheries	368,234,935	88,365,912	413,904,461	55,956,236	450,685,357	57,996,258	485,591,843	50,893,220	517,101,513	52,392,986
151	Meat, fish, vegetables, fruit, fat and oil	4,951,907,364	3,092,950,304	4,574,403,533	2,827,254,088	5,084,211,197	2,707,029,408	5,272,557,691	2,523,404,264	5,301,644,314	2,390,616,245
152	Dairy products	272,610,940	141,625,157	326,301,213	96,691,737	339,447,251	97,417,292	328,186,858	98,565,677	360,609,633	87,571,603
153	Ground grain products, starch, starchy products and convenience animal feed	1,592,353,177	450,304,162	1,775,846,034	450,486,959	1,777,568,264	486,426,200	1,787,904,160	487,946,200	1,862,695,722	470,753,114
154	Other foodstuff	3,093,576,884	1,146,285,770	2,947,793,820	1,205,155,616	3,160,428,762	1,306,171,849	3,417,614,139	1,232,844,919	3,560,492,360	1,194,977,928
155	Beverages	311,958,453	302,685,611	287,135,293	272,292,140	316,544,704	311,347,521	349,767,824	277,680,933	339,489,195	296,042,687
160	Tobacco Products	532,310,857	146,067,738	647,849,939	161,992,119	596,563,245	136,471,906	626,686,999	164,704,144	645,919,276	157,429,315

9

IMPORTANT TOP POLICY DOCUMENTS, PLANS, PROGRAMS AND PROJECTS FOR SUSTAINABLE FOOD SYSTEMS

On a national scale, at the highest level, Development Plans as well as international agreements, contracts and memorandum of understanding constitute the main framework of documents such as policy, strategy, action plan, project, support documents etc. on sustainable food systems in Türkiye. In this context, 11th Development Plan[84] that covers the period 2019-2023, 2021 Economic Reform Package[85], New Economy Program that covers the period 2019-2021[86], 100-Day Presidential Executive Programme[87], Strategy Document of Ministry of Agriculture and Forestry that covers the period 2019-2023[88], Final declaration and action plans of the 3rd Agriculture Forest Council[89], strategy documents and relevant sections of action plans of other relevant Ministries, Investment Programs and relevant sections of other national programs, policies and documents are included. The detailed information on European Union, relations with international organizations and agreements and contracts to which it has become a party was included in the book "European Union, International Organizations and Conventions"[90] published by MoAF and General Directorate of European Union and Foreign Relations.

Under the 2030 Agenda for Sustainable Development agreed under 193 countries' signatures, 17 Sustainable Development Goals (SDG) in total were defined through United Nations (UN) Sustainable Development Summit held in September 2015. The main purpose of SDGs is to work so that no countries and nobody are left behind in the development process with the slogan "leaving no one behind" during the period 2015-2030. Türkiye has made a commitment for SDGs and participated in the 2030 Agenda. SDG is strictly followed by Strategy and Budget Office of the Presidency and it has undertaken the role of coordination and reporting for relevant studies. "Support to the Ministry of Agriculture and Forestry in SDGs' Harmonization and Implementation" Project which was initiated in cooperation with MoAF and FAO in 2018 and implemented to raise awareness about "The 2030 Agenda for Sustainable Development" and build the capacity of the Ministry in this field was successfully completed. On the other hand, the Turkish Statistical Institute (TURKSTAT) is responsible for monitoring the indicator system of the 2030 Agenda for Sustainable Development, compiling the data, publishing it through an appropriate distribution channel, encouraging the production of unproduced indicators, as well as ensuring communication and coordination with national stakeholders and international organizations. In this context, responsible and relevant institutions were determined for each indicator and published in the annex of the Official Statistics Program, 2017-2021 (OSP). In addition, sustainable development indicators produced

9.1. IPA and IPARD Program

With monetary funds that EU provides in the accession process, the EU also contributes to adaptation efforts to EU legislation. In this framework, the EU has provided support valued at 240 million Euro for agriculture, water quality and nature conservation sectors in the scope of institutional capacity building component of the Instrument for Pre-Accession (IPA) since 2007. With this grant, approximately 60 projects have been conducted by the Ministry to establish necessary infrastructure and administrative structures in order to adapt to relevant EU legislation and implement them. Some of them are being currently implemented. In the same period, the amount of EU grant under the rural development component of IPA (IPARD) is approximately 1.4 billion Euro and the support is provided to our farmers by ARDSI on a project basis in the framework of certain criteria. Investment areas to which support is provided under IPARD-II have been collected under three main measures. They are:

Investments for Physical Assets of Agricultural Enterprises: Milk Production, Meat Production (red meat and poultry meat), Egg Production…

Investments for Physical Assets related to Processing and Marketing of Agricultural and Fisheries Products: Processing of milk and dairy products and installation of milk collection centres, processing of meat and meat products

84 https://www.sbb.gov.tr/wp-content/uploads/2019/07/OnbirinciKalkinmaPlani.pdf
85 https://ms.hmb.gov.tr/uploads/2021/03/Ekonomik-Reformlar-Kitapcigi.pdf
86 https://ms.hmb.gov.tr/uploads/2019/10/Yeni-Ekonomi-Program%C4%B1-2019-2021.pdf
87 https://www.tccb.gov.tr/assets/dosya/100_GUNLUK_ICRAAT_PROGRAMI.pdf
88 https://www.tarimorman.gov.tr/SGB/Belgeler/stratejikplan.pdf
89 http://www.tarimormansurasi.gov.tr/
90 https://www.tarimorman.gov.tr/ABDGM/Belgeler/Uluslararas%C4%B1%20Kurulu%C5%9Flar/AVRUPA%20B%C4%B0RL%C4%B0%C4%9E%C4%B0,%20ULUSLARARASI%20KURULU%C5%9ELAR,%20S%C3%96ZLE%C5%9EMELER.pdf

(slaughterhouse, shredding facility, processing facility), Processing of Fruit and Vegetables, Processing of water products…

Diversification of Farm Activities and Business Development: Vegetative production, apiculture, crafting and local products, rural tourism, farm fisheries, machinery pools and renewable energy

9.2. FAO-Türkiye Partnership Programme on Food and Agriculture (FTTP) and FAO-Türkiye Partnership Programme on Forestry (FTFP)

Under the host Agreement signed between The Republic of Türkiye and United Nations Food and Agricultural Organization (FAO), with additional agreements signed between FAO and the Republic of Türkiye, FAO-Türkiye Partnership Programme on Food and Agriculture (FTPP) Agreement and FAO-Türkiye Partnership Programme on Forestry Agreement were made. In this context, the aims of FAO-Türkiye Partnership Programmes are to ensure the food security, reduce rural poverty, ensure sustainable forest management and combat desertification. Currently, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Türkiye, Turkmenistan, Uzbekistan and other countries which have mutual interest can benefit from the programme. A total of 20 million USD under FTPP and a total of 10 million USD under FTFP were funded by the Republic of Türkiye. In the scope of programmes, the Ministry of Agriculture and Forestry is represented on behalf of the Republic of Türkiye. In the first phase of FTTP (FTPP-I), 28 projects were implemented in 16 countries. Under the second phase of FTTP and FTFP, the projects are currently being implemented. In this context, in conclusion, the projects related to the following subjects are supported;

- Food security and nutrition
- Agricultural and rural development
- Protection and management of natural resources
- Agricultural policies
- Food safety
- Sustainable forests, land and natural resource management and prevention of land degradation
- Institutional reform, education and national capacity building

In addition to FTTP, a new Programme called FAO-Türkiye Partnership Programme on Forestry (FTFP) that includes sustainable forest management, mitigation of drought impact, land degradation, combatting desertification and climate change and similar subjects has been initiated with another trust fund of 10,000,000 USD. In this framework, 2 projects have been accepted.

The main aims of FTPP and FTFP are to provide a concrete, financial and operational framework for active cooperation with the above-mentioned beneficiary countries and other countries of mutual interest in the fields of Food Security and Poverty Reduction. The aims of FTPP and FTFP respond to priority needs defined in Country Programme Framework (CPF) in which national and sub sub-regional stakeholders are included and they are presented through official requests.

9.2.1. BRIDGES Project

The first project under FTPT is the "Project called Bridges between Türkiye and Africa (BRIDGES)" with a budget of 3 million USD. The project covers the years 2018-2021. Under the project which started to be implemented in Mauritania, Sudan, Eritrea which are among the Great Green Wall countries, and which will last three years, restoration activities, the development of non-wood forest products, establishment of monitoring systems, information management, awareness raising/communication and visibility activities are undertaken in a total of 5,000 hectares of area (2,000 ha in Sudan, 2,000 ha in Mauritania and 1,000 in Eritrea).

9.2.2. Black Sea Economic Cooperation Organization Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) Project

Within the scope of the FAO-Türkiye Food and Agriculture Partnership Program Phase II (FTPP-II), the Black Sea Economic Cooperation Organization Regional Cooperation Center for Sustainable Food Systems (BSEC-CSFS), with the code GCP/SEC/019/TUR, proposed by our country is implemented in cooperation with FAO and Black Sea Economic Cooperation Organization (BSEC). Beneficiaries of the project with a budget of 500,000 USD are 13 BSEC member states and the project will be implemented for three years (1 August 2020- 31 July 2023).

The project aims to strengthen regional cooperation in the food security and safety through sustainable natural resource management including aquatic resources, poverty reduction and improvement of institutional capacities. Project outputs are as follows.

- Black Sea Economic Cooperation Organization Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) was established in the Ministry of Agriculture and Forestry.
- The report compiled on current situation sustainable food systems in the BSEC region was prepared and distributed.
- Awareness about gender-sensitive sustainable food systems and information and experience exchange on sustainable food systems between BSEC member states were strengthened.
- Necessary gender-sensitive tools, information and appropriate methodology on gender-sensitive sustainable food systems were developed and technical capacity of BSEC member states was strengthened.
- BSEC-CSFS was integrated into networks of similar organizations working on a national, regional and global scale.

The project is expected to make a significant contribution to the objectives of the 2021 Sustainable Food Systems Summit and contribute to the achievement of relevant Sustainable Development Goals throughout the BSEC Region.

9.2.3. The Project on the Reduction of Food Loss and Waste in SEC Countries

Partners of the project with a budget of 1.5 million USD which has been implemented in cooperation with FAO for 2 years since 1 November 2019 under FTPP-II are Türkiye, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Project outputs are as follows;

1. National strategy policy and action plans were developed to reduce food loss and waste.
2. Data collection systems on food loss and waste were implemented and food loss and waste were measured and monitored.
3. Information management and capacities were increased/improved.
4. a) Understanding and awareness about food loss and waste (their reasons, impact and solutions) by actors in all the sectors including consumers were increased at national and regional level.

   b)Target groups and stakeholders were encouraged and strengthened through the acquisition of necessary technical information and skills to reduce and prevent food loss and waste.
5. Intra-regional cooperation in relation to food loss and waste was enriched.

9.2.4.Land Banking

Abandonment of the land or non-use of arable agricultural lands are linked to food security, which leads to economic and potential production loss. Secure land tenure and sustainable land

management may contribute to strengthening of local food systems and making them more sustainable in a strong manner. Therefore, considering that COVID-19 shows the importance of food security and they use local natural resources to strengthen local food production, the development of land banking instruments and promotion of this system may make a positive contribution to food security. In this regard, the project "Establishment of Land Banking Instruments and Development of Land Consolidation Procedures to Prevent Land Abandonment" started to be implemented in cooperation with FAO in 2021 under FTTP-II.

9.3. Assistance to Syrian Refugees Provided by Türkiye and Cooperation with the UN in Relevant Projects

According to United Nations High Commissioner for Refugees (UNHCR), the Syrian civil war which started on 15 March 2011 led to the death of 500,000 people including civilians. 13.1 million people needed humanitarian aid and 6.6 million people were displaced. 4.9 million people migrated to neighbouring countries.

Türkiye hosts the largest refugee population in the world. The number of Syrians under temporary protection in the country reached 3,699,388 million in 2021, almost half of whom are children (47%)[91]. Currently, Türkiye hosts the largest refugee population with approximately 3.7 million Syrians. Until this date, Türkiye has spent 41 billion USD on this issue.

With its wide information and experience on agriculture and rural development, the Ministry of Agriculture and Forestry provides all kinds of support to refugees and strengthens its cooperation with UN agencies on this issue.

Apart from the provision of basic needs for Syrian refugees, ensuring their participation in labour market through vocational and language training will contribute to the mitigation of their vulnerabilities. In this context, agriculture is the key sector in ensuring the participation in labour market. As emphasized in Türkiye Chapter of the 2018-2019 UN Regional Refugee and Resilience Plani;

- Syrians come from a similar agri-environment and thus including them in the agricultural sector in Türkiye will not require a long inception phase.
- The agricultural sector provides short-term outputs and sustainable income through opportunities created by the sector without making large investments.
- Similarly, employment of Syrians in the agricultural sector in Türkiye will also help them to return to their own countries.

Through joint studies with the Ministry of Agriculture and Forestry, UN Agencies and other international organizations that provide funding, various projects were prepared for Syrians.

These projects strengthen communication between Syrian refugees and host community, create employment opportunities for beneficiaries of the project and improve the social integration between Syrians and host communities.

9.3.1. Project on Building Resilience of Syrians under Temporary Protection and Host Communities in Türkiye through Supporting Socio-Economic Integration and Creating Livelihood Opportunities (OSRO/TUR/901/EC)

The project which started in 2019 with a budget of 10 million Euro (11.5 million USD) from The European Union Syrian Regional Trust Fund (MADAD) will last 30 months and it will be implemented in the provinces of Adana, Gaziantep, Hatay, İzmir, Kahramanmaraş, Kilis, Van, Bursa, Manisa and Şanlıurfa. The project aims to increase livelihood opportunities of Syrian

91 https://www.goc.gov.tr/gecici-koruma5638

refugees and local citizens in agriculture and ensure their socio-economic integration into Türkiye's conditions. The project partners are FAO, Ministry of Agriculture and Forestry, Ministry of Family and Social Services, Labour and Social Services (MoFLSS), ISKUR, Ministry of Interior Directorate General of Migration Management, TRC, Ministry of National Education and the Office of the Vice Presidency. Target audience of the project are Turkish Citizens and Syrian Refugees under Temporary Protection and the core activities of the project are presented below;

- Organizing vocational training programmes and Turkish language courses
- Organizing employment expositions to increase the employment
- Establishing Agricultural Employment Boards, Ensuring that Agriculture Intermediaries are registered to these Boards
- Establishing Farmer Field School System to provide new agricultural techniques
- Supporting agricultural and food producers with a grant programme and developing their activities and creating additional employment
- Covering SSI premiums of project beneficiaries employed for 6 months

9.4. Zero Waste Project

Zero waste principle started to be implemented to build the existing system on a more regular, systematic and applicable ground for the prevention of waste, more efficient use of natural resources, prevention and minimization of waste generation by reviewing causes of waste generation, separating waste at its resource and recycling of waste in case of waste generation. The National Zero Waste Project, implemented by the Ministry, Environment and Climate Change under the auspices of Mrs. Emine ERDOĞAN, is being implemented gradually within the framework of the Zero Waste Regulation, which was published in the Official Gazette dated 12 July 2019 and numbered 30829. As of 2018, Zero Waste Project is aimed to be gradually implemented in public sector agencies, educational institutions (university, school etc.), shopping centres, hospitals, recreation facilities (hotel, restaurant etc.), big businesses and it is aimed to be implemented all over Türkiye in 2023. Environment Agency was established in order to prevent environmental pollution, contribute to the protection, improvement and development of green areas, increase resource efficiency in line with the circular economy and zero waste approach, and carry out activities for the establishment, operation, monitoring and control of a deposit management system on a national scale.[92] Zero Waste project was awarded UNDP's Sustainable Development Goals Action Award.

9.5. Project on Agricultural Practices for Ecosystem-Based Adaptation (EBA) to Climate Change in Steppe Ecosystems

The EU Project "Agricultural Practices for Ecosystem-Based Adaptation (EBA) to Climate Change in Steppe Ecosystems" was implemented and completed with joint work of General Directorate of Agricultural Reform and Food and Agricultural Organization Sub-Regional Office for Central Asia (FAO-SEC) between the years 2016-2018. With this project, it was planned to increase climate resilience in Anatolian Steppes and 3 main outputs of the project achieved are stated below.

- Identifying the vulnerability of ecosystems and agricultural systems under the existing and future impact of climate change in Anatolian Steppes.
- Strengthening institutional capacity for adaptation (EBA) planning, implementation and monitoring based on ecosystem in Anatolian Steppes.
- Integrating EBA to local protection policies and strategies by scaling up and replicating the Anatolian Steppes Ecosystem experience and ensuring the use of steppe ecosystem resources and sustainable use of agriculture.

92 https://www.mevzuat.gov.tr/mevzuat?Mevzuat- No=32659&MevzuatTur=7&MevzuatTertip=5

9.6. Rural Development Investments Support Program (RDISP)

- Establishing alternative income sources by increasing level of income in rural areas,
- Developing agricultural marketing infrastructure,
- Increasing the use of agricultural machines,
- Strengthening the food security,
- Scaling up pressurized irrigation systems,
- Increasing rural development project events which are being implemented,
- Building a certain capacity in a rural community,
- Supporting small and medium-sized enterprises to ensure the integration of agricultural production and agricultural sector,

In order to achieve the above-mentioned objectives, grant support at the rate of 50% is provided for processing, storage and packaging of agricultural products, new facilities, technology renovation, production and use of alternative energy resources, establishment of irrigation systems and procurement of tools and equipment. Natural and legal persons (company, cooperative, union etc.) can apply for grant support.

Presidential Decree for 4th 5-Year Programme for the continuation of RDISP practices between the years 2021-2025 was approved and Communiques on Rural Infrastructure Investments and Rural Economic Investments were published. The preparations are ongoing.

9.7. Licensed Warehousing

The aim is to identify the standards of agricultural products that can be standardized such as cereal, legume, oil seeds, cotton, hazelnut, olive, olive oil and dried apricot which are suitable for storage and assist in the storage of them in stores that belong to licensed store enterprises under safe and healthy conditions and trading these products through product securities.

Rental, analysis and transportation supports are provided to producers and producer organizations that keep their products in licensed warehouses and that are within the scope of the Support Decision.

9.8. Expert Hands in Rural Development Project

It is a project prepared to contribute to the employment of the youth graduating from vocational colleges that provide training on agriculture, livestock, forestry, food and water products or these departments of university in rural areas, support the entrepreneurship in agricultural, livestock, forestry, food and water products and promote the implementation of these activities by experts, increase the quantity, quality and efficiency of agricultural production through trained workforce, support the investments to set an example and take the lead for enterprises that make agricultural production in rural areas.

The project includes the projects in relation to agriculture, livestock, forestry, food and water products that will be implemented at the project area by university and/or high school graduates who live/promise to live at settlement areas with a population of less than 20,000.

It entered into force with the Communique published on 17 December 2019 pursuant to the Presidential Decree published on Official Gazette of 12.07.2019. The support programme for 2019 was initiated in the provinces of İzmir, Düzce, Mardin and Amasya as pilot provinces. The grant payment was provided to 100 people for the projects in 2019. Studies are being conducted to ensure that they are implemented in all the provinces of Türkiye as of 2021.

Projects for which grants are paid:

a) Projects for animal production

b) Projects for vegetative production

c) Projects for the production of water products

d) Projects for the production of local products and medical and aromatic plants

e) Projects for processing, packaging and storage of the products stated in the items (a), (b), (c) and (d).

9.9. Breath for the Future Campaign

Türkiye has a rich ecological diversity. Afforested land in Türkiye was 20.8 million hectares in 2002, which increased to 22.6 million hectares in 2019. It is planned to increase to 23.4 million hectares in 2023. In this framework, November 11 was declared as National Afforestation Day by President Recep Tayyip ERDOĞAN in 2019 in order to protect forests that have a great economic, ecological and social importance, ensure their sustainable management, make Türkiye healthier and livable for future generations. In the first year of the national day and in the context of the Campaign called Breath for the Future[93], 11 million saplings were aimed to be planted and approximately 13.5 million saplings were planted with the support of Turkish citizens. In 2020, saplings were planted, not only in our country but together with representatives from over 60 countries. Türkiye set a 'world record' for planting the most saplings within an hour, making it to the Guinness Book of Recordsr.

9.10. Agricultural Digitalization and Smart Agricultural Practices

Digital technologies offer potential solutions to develop the sustainability in an economic, social and environmental manner for food systems in the world. These technologies contribute to the development of promising approaches for sub-areas of food systems and solutions of key issues encountered in terms of agricultural production. As a result of the implementation of correct digital solutions in agriculture, the progress in various areas such as making improvements in primary production, increasing supply chain and logistic performance and sustainable use of scarce natural resources is mader.[94]

To review Türkiye's profile in agricultural digitalization, firstly, it is necessary to look at digital infrastructure development. Our country has made important progress in digital access. In terms of progress in network coverage (network performance and accessibility), Türkiye ranks 5th among 150 countries and an increase of 300% in download speed occurred between the years 2015-2017.[95] Also, 4G coverage area has reached 90% of the population. While 97% of citizens have mobile registration, 71% of the population are active internet users. In terms of mobile network coverage (mobile network coverage measures the percentage of residents under any mobile cellular signals without considering whether they are registered or not), 99.69% of population of Türkiye is in a mobile network coverage area.[96] All these values indicate that our country is quite strong in terms of digital infrastructure, which is pleasing as a facilitative factor for agricultural digitalization. However, most of agricultural producers, farmers cannot have access to or use the tools such as modern technologies and decision support systems which are necessary for increasing efficiency of products and competitive production under today's conditions.[97] When the problems experienced due to lack of technology transformation for efficiency and sustainability are addressed with regional water restriction problems, they may grow further.[98] In addition to these problems experienced in production, we also face with various problems such as interaction of producers, distributors and the market which are included throughout the agriculture-food value chain and excessive distance between consumer and producer. The use of digital technologies in agriculture is critical to offer innovative solutions to the problems mentioned.

As the impact of digitalization is observed in all the sectors, digital transformation also occurs in the agricultural sector. During the transformation in which

93 https://gelecegenefes.com/ Detailed information can be obtained from https://gelecegenefes.com/.
94 https://www.mdpi.com/2071-1050/13/6/3223/pdf
95 http://www.fao.org/documents/card/en/c/cb3954en/
96 https://www.tubisad.org.tr/tr/images/pdf/tubisad-dde-2020.pdf
97 http://www.fao.org/documents/card/en/c/cb3954en/
98 http://www.fao.org/documents/card/en/c/cb3954en/

developed countries take the lead, successful projects in smart agricultural practices developing through precision agriculture technologies and industry 4.0 with the integration of different digital technologies (artificial intelligence, internet of things, GPS, big data and blockchain, image processing technologies etc.[99]) were developed and implemented. The importance of digital transformation in national plans are also emphasized for all the sectors in our country and relevant actions are planned. As a separate section is allocated for digital transformation in the Eleventh Development Plan, the measure on the use of technology in agriculture "416.4 Innovative and environment-friendly production techniques, especially smart agricultural technologies, will be developed and supported" was also included.[100] In the Final Declaration of the 3rd Agriculture Forest Council, the following strategies on digitalization and smart agricultural practices were included:

"8-Establishing digital value chain (from seed to table) in an effective cooperation with all the relevant institutions and organizations, taking an agricultural census and establishing upgradable database,

20-Scaling up Smart Agricultural Practices by integrating information technology into the agricultural sector to increase agricultural efficiency and use the resources more effectively, increasing the number of farmers/engineers/subprofessionals who are qualified in Smart Agriculture through the implementation of special programmes".

In the light of the strategies and actions mentioned, examples of successful agriculture and agricultural digitalization in both public and private sector have started to emerge. Major projects on digital transformation in agriculture are implemented by the Ministry in our country. MoAF leads in the use of digital and relevant technologies. As one of the Ministries which use satellite technologies the most across the country, MoAF can monitor agricultural and forest assets, water resources of the country, follow the emerging issues and can produce quick solutions with the help of satellite images. Also, non-cultivated areas can be controlled and mapping infrastructure can be established in cultivated areas with the help of this technology. The control of land development in agricultural lands, the status of forests and water resources and cross-check of the support provided in some products may be also conducted through images obtained from satellite systems.[101]

In addition to satellite-based decision support systems which make a significant contribution to agricultural policy development processes, transformations in which the impact of digitalization on citizens can be observed are also made. In 2018, the Ministry executed e-government integration successfully and managed to provide many integrated services online to citizens.[102] The year 2020 was declared as "Agricultural Digitalization Year"[103] to adapt to this digital transformation in agriculture faster and accelerate the integration of digital technologies into agriculture. The MoAF who accelerated its studies in this context developed a project idea on the preparation of National E-agriculture Strategy and started to implement it in cooperation with Food and Agricultural Organization (FAO).[104] Firstly, the project aims to identify short, medium and long-term steps that Türkiye should take in relation to E-agriculture through workshops by including all the sector stakeholders in the process. Secondly, it aims to identify perceptions and expectations of farmers about e-agriculture.[105] In the scope of digitalization year activities, E-agriculture portal[106] through which agricultural and animal records and transactions are collected on a single platform was also implemented in 2020. E-agriculture portal is one of agricultural digitalization steps of MoAF in line with the 2023 goals and the portal aims to ensure that every citizen who has business to be processed by the Ministry, particularly farmers undertake their works online in a shorter time, without going to provincial and district directorates and completely without any documents.[107]

For the expected sustainability transformation in food systems, it is critically important that agricultural data

99 Bilgi Teknolojileri ve İletişim Kurumu, Akıllı Tarım
100 https://www.sbb.gov.tr/wp-content/uploads/2019/07/On-Birinci-Kalkinma-Plani.pdf#page=88&zoom=100,90,162
101 https://www.tarimorman.gov.tr/Haber/4650/Tarimda-Dijitallesme-Suruyor
102 https://www.tarimorman.gov.tr/Haber/4650/Tarimda-Dijitallesme-Suruyor
103 https://www.tarimorman.gov.tr/Haber/4650/Tarimda-Dijitallesme-Suruyor
104 https://www.tarimorman.gov.tr/Haber/4650/Tarimda-Dijitallesme-Suruyor
105 Information and Communications Technologies Authority, Smart Agriculture
106 https://etarim.gov.tr/
107 https://www.tarimorman.gov.tr/Haber/4650/Tarimda-Dijitallesme-Suruyor

are collected and compiled on a platform and the data are transformed into fast and correct decision systems for agricultural decisions and all the stakeholders have access to these systems and the data create value.[108] Apart from the portal and the studies, the MoAF conducted and keeps conducting many projects to collect and use agricultural data, which is one of the most important dimensions of agricultural digitalization. Some of the studies conducted by the Ministry and relevant stakeholders on digitalization of agricultural data in Türkiye and transfer of agricultural systems to digital platforms are listed below.

- **TAD PORTAL[109]:** In order to protect our country's agricultural lands and ensure the controlled management of potential non-agricultural lands, an automation system named TAD PORTAL[110] was established to manage the amendments to Law No. 5403 on Soil Conservation and Land Use and develop the software required for carrying out the processes of the Department of Land Assessment of the General Directorate of Agricultural Reform within the automation system.

- **National Geographic Soil Fertility Information Management System:** Within the scope of the system; in order to update the productivity parameters of Türkiye's soils and to determine the toxic element contents, and to use our country's natural resources in a sustainable and efficient manner in accordance with its capability, 50,000 soil samples are taken from agricultural areas to determine the nutrient content, fertility status and toxic element status of the soils. Soil maps with a scale of 1:100,000 are prepared through project data and the data are uploaded to "National Soil Data Bank" which is updatable and searchable. Soil information management system prepared and the data produced will also contribute to the prevention of land degradation and effective implementation of climate change adaptation and regional action plans.

- **Geographical Soil Organic Carbon Information System:** Under the study conducted in cooperation with MoAF and FAO, Soil Infertility - Organic Carbon Geographic Information System Web Portal was established through soil data created on a territorial and basin basis, Soil Carbon Map of Türkiye was prepared and it was integrated into the World Carbon Map.

- **National Soil Information System in Türkiye:** Soil Database was created to form a basis for many studies, especially agricultural and forestry sectors by supporting soil data by MoAF, prevent recurrent soil studies and establish "National Soil Information System in Türkiye". A web-based portal that can provide thematic map outputs to submit soil map and survey cards stored in Soil Database in a standard way to users and conduct various examinations and analyses was developed. As a result of the study that started in 2013 and is ongoing, about 3,000 soil maps and data and profile information on about 59,000 soils are published on http://toprakportal.cem.gov.tr/.

- **DEMIS (Dynamic Erosion Model Monitoring and Evaluation System) and UDREMIS (National Dynamic Wind Erosion Model Monitoring and Evaluation System):** The software called DEMIS (Dynamic Erosion Model Monitoring and Evaluation System) and UDREMIS (National Dynamic Wind Erosion Model Monitoring and Evaluation System) were developed to ensure that MoAF, General Directorate of Combating Desertification and Erosion (GDCDE) monitor and evaluate the erosion that occurs in the soils of Türkiye and use them as a base in soil-based national and international projects such as Sustainable Land Management (SLM), Land Degradation Neutrality, mainly Food Security. As a result of it, they were produced together with the statistics of Water Erosion Map of Türkiye and Wind Erosion Risk Map of Türkiye and it made available to all the institutions and citizens through different geographical portals and a mobile application.

- **Genetic Resources Database:** With the project "Genetic Resources Database and Business Processes Management System" to facilitate the access to genetic resources, the studies are implemented under the activities related to the unification of the information on Plant, Pet, Aquatic, Microorganism and Invertebrate Genetic Resources studied by DGARP Institutes on a database.

108 https://www.bilisimzirvesi.com.tr/documents/Dokumanlar/sunumlar/sinan-ansen-pdf.pdf
109 https://tad.tarim.gov.tr/
110 https://tad.tarim.gov.tr/

- **National Rangeland Use and Management Project:** The most comprehensive and broadest database on rangeland was created through the National Rangeland Use and Management Project. The database created will also form a basis for plans such as national livestock, rural development, agricultural production basins, protection of natural resources and environmental protection.

- **Noah's Ark Biodiversity Database:** Biodiversity Inventory of Türkiye was completed with living groups with land works undertaken by over 900 academicians and subject-matter experts in 81 provinces. Biodiversity inventory data were transferred to Noah's Ark Biodiversity Database[111] created under MoAF, General Directorate for Nature Conservation and National Parks (GDNCNP) and biodiversity map of our country was created. The database allows for many examinations and reports which are specific to "species" and "special areas" on biological richness of our country and helps users to have access to their specific rights and data. The number of data reached 1,900,000.

- **TARBIL and IDEBIS:** The EU Project "Agricultural Practices for Ecosystem-Based Adaptation (EBA) to Climate Change in Steppe Ecosystems" was implemented and completed with GDAR and UN Food and Agricultural Organization Sub-Regional Office for Central Asia between the years 2016-2018. Under this project, Anatolian Steppes were defined and its map was prepared in digital environment. With this study, types of Steppe ecosystems were also identified. Precipitation-climate-elevation maps produced under the project, steppe ecosystems sensitivity maps and maps on steppe ecosystem types were created through IDEBIS system under TARBIL system of the Ministry and they were transformed into an online base. The base can be actively used with layers such as forest, rangeland, wetlands, cadastral and agricultural areas, satellite and orthophotos, administrative limits etc.

- **DGARP-SUET:** "Water Consumption Guide of Irrigated Plants in Türkiye" and "Irrigation Techniques Guide of Irrigated Plants in Türkiye" prepared by DGARP are used by public entities, universities and private sector to reveal the water efficiency of basins and water budget of the basin, identify agricultural support at sub-basins level by considering existing water potential and water consumption of plants, as well as climate, soil and topography and identify water needs of plants that will be used at planning, design and operation stages of irrigation projects. In this context, the relevant guide was used in basin-based studies in 2019. The guide was transferred to the digital environment called DGARP-SUET in line with the demand and recommendations of the sector to reach a broader user profile.

- **Farmers Registry System (FRS):** FRS is an electronic document management system created by MoAF to record, update and develop agricultural activities for farmers, identify, audit and monitor agricultural support and agricultural policies between integrated systems.[112] With the help of FRS, the efficiency in the processes of monitoring, auditing and reporting agricultural support has increased and agricultural support policies have become healthier, transparent and evaluable thanks to the information obtained from the system. The system shows an inclusive and facilitative approach because it helps farmers to have access to many support mechanisms from a single point. The data systems like FRS are critical for agricultural policy and decision-making processes and it is critically important for the development of food systems to keep developing and support these systems.

- **The Digital Agriculture Market (DITAP):** Small and medium-sized enterprises predominantly produce perishable agricultural products in Türkiye and many other countries. Due to COVID-19, weekly fresh markets for fruit and vegetables slowed down in many countries including Türkiye. Small farmers especially in urban environments had difficulty in having access to markets during the COVID-19 pandemic. As a part of sustainable food systems, organization and marketing capacities of small farmers should be strengthened and particular importance should be given to the continuation and restructuring of them in a manner that will integrate into national and finally global food systems. The Ministry of Agriculture and

111 Detailed information can be obtained from http://www.nuhungemisi.gov.tr/.
112 https://ziraatodasi.gen.tr/ziraat-odasi-rehber/oda-uyelik-islemleri/ciftci-kayit-sistemi-cks-nedir/

Forestry launched the Digital Agriculture Market (DITAP) that would transfer all the agricultural and food chain ranging from food production to consumption to digital platform with the institutions which MoAF cooperated with in 2020. DITAP will help agricultural supply and demand to meet "the digital market place" approach and contracted agricultural practices. DITAP will help producers to earn more income and help vendors to find agricultural products in the quality intended by the agricultural sector and it will help consumers to have access to agricultural products at a cheaper price. Agricultural sector stakeholders who benefit from DITAP (www.ditap.gov.tr) will be able to benefit from supportive credit packages created under contracted agriculture. Therefore, this model may be promoted or expanded for sustainable food systems and bigger agricultural markets.

- **Smart Agriculture Platform:** Smart Agriculture Platform was organized by the MoAF's General Directorate of Agricultural Reform in 2019 to bring together the relevant units of the Ministry, TARMAKBİR, universities and other relevant stakeholders. In the field of agricultural technologies and digital farming systems, the Platform is engaged in activities with the following purposes:
  - » To increase the functionality of the guiding institutions,
  - » To work towards the development of the sector,
  - » To build bridges between subject stakeholders,
  - » To express the problems before the relevant public institutions,
  - » To make recommendations to guide public institutions and the sector,
  - » To contribute to the coordination of the activities between the public-universities and the private sector in the implementation of new technologies,
  - » To carry out information and awareness-raising activities for farmers.
- **Agricultural Technology and Mechanization Committee**: It was established in 2020 to work on agricultural mechanization, new agricultural technologies and smart agriculture issues, to bring together the stakeholders, to take guiding recommendations, to contribute to the policies and strategies to be developed, and to develop solutions to the problems of the sector and the farmer.
- **"Tools for Digital and Sustainable Agriculture – Smart Agriculture Expertise (SAGRE)" Project:** The project proposed under EU Erasmus+ was accepted and started with the opening meeting in June 2021. With the project, a learning program on Smart Agriculture Expertise will be developed and the training of trainers who will take part in this subject will be focused on

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3RD AGRICULTURE FOREST COUNCIL

The Agriculture and Forestry Council was established to allow for the organization of interviews at officials and representatives level for the development of agriculture and livestock in the country, implementation, promotion and development of new technologies and identification of problems encountered in relation to services for agricultural and livestock sectors and solutions and to make decisions that will assist in the formation of strategies on agricultural development.

The 3rd Council of Agriculture was held between 18-21 November 2019 in Ankara following nearly 4 months of work, with the attendance of the academia, NGOs, private sector representatives, farmers as well as subject-matter experts from the Ministry of Agriculture and Forestry and other relevant public agencies. Under the 3rd Agriculture Forest Council Meeting, 21 Action Tracks were established at the Commission level, shedding light on the future of agriculture and forestry in Türkiye by receiving over 20000 opinions from over 1,300 participants. 21 Working Groups established are as follows.

- Agricultural Structure and Transformation
- Vegetative Productive and Plant Health
- Animal Production and Animal Health
- Fisheries and Water Products
- Agricultural Inputs and Financing
- Food Security
- Agricultural Meteorology, Management of Environment and Natural Recources
- Agricultural Irrigation and Water Management
- Rangeland Management
- Agricultural Instruction, Agricultural Extension, Publication and R&D
- Producer Organization in Agriculture
- Agricultural Marketing and New Marketing Trends
- Rural Development and Employment in Agriculture
- Agricultural Support Policies
- Agricultural Laws
- Agricultural Production Planning
- Technological Transformations in Agriculture
- International Relations and Strategic Approaches
- Sustainable Forest Management
- Innovative Approaches in Combating Forest Fires
- Benefiting from Forest Resources

All the information and documents related to the council can be obtained from http://www.tarimormansurasi.gov.tr/. The objectives set on the basis of the Commission, final declaration publicly disclosed and promissory concrete actions are presented below. Promissory 46 key actions and their sub-actions were identified based on the results of the 3rd Agriculture Forest Council by the Ministry of Agriculture and Forestry at the beginning of 2020. They will be monitored on a quarterly basis by the end of 2023 and the implementation results are released to the public.

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CONCLUSION AND EVALUATION

Due to balanced and safe nutritional needs of the increased population, sustainable food systems have become significant at national and global level, which has also threatened the achievement of Sustainable Development Goals. Recently, poverty has tended to increase because of the impact of COVID-19 pandemic. The UN put the regulation on Sustainable Food Systems Summit on the agenda in 2021. In addition to that, climate change and agricultural environmental degradation increase the importance of the requirement of developing sustainable food systems. Therefore, it is needed to guarantee the food safety through sustainable food systems in order to increase the prosperity of farmers and leave a better world for future generations.

Therefore, a holistic approach which covers value-added activities and activities such as the production, harvesting, processing, distribution and consumption of food products with the participation of stakeholders of the relevant sectors is needed.

Also, sustainable food systems are at the core of the UN Sustainable Development Goals and they play a critical role in achieving the relevant objectives that include zero hunger, prevention of poverty, reducing of food loss and waste to which Türkiye also attaches special importance.

On the other hand, the pressure of rapid urbanization in agricultural lands, migration from rural areas, abandonment of agricultural lands, food losses and waste, unforeseen economic fluctuations that affect input, production and marketing costs are main barriers to ensuring food safety.

In order to eliminate the barriers, Türkiye takes important steps in economic, social and environmental fields. In this framework, agriculture is one of the key sectors for the development of sustainable food systems with its strategic, competitive and socio-economic structure

Intensive farming techniques used across the world for almost a century lose their efficiency against climate change whose impacts have started to be observed in recent years. Especially in the regions which are sensitive to climate change, intensive farming techniques are replaced by protective farming techniques. The promotion of protective agriculture in Steppe areas which are the most sensitive to climate change in our country is considered both as a resilient production model and a cost-effective method.

At this point, it is necessary to state that Türkiye is one of the most important countries in terms of agricultural production in the world, with its rich biodiversity and higher degree of self-sufficiency, especially for certain agricultural products. Türkiye ranks 1st in Europe and 7th in the world in agricultural production.

Furthermore, Turkish agriculture helps consumers to have access to adequate, healthy, reliable food and food with high nutritional value. Main aims of Turkish agricultural policy are increased efficiency, quality production, sufficient and safe food supply with affordable prices and consequently ensuring the food security.

In order to achieve these aims, many important improvements have been made in a wide range of sub-sectors of the agricultural sector. In this regard, from 1999 to 2019, there were massive annual increases in vegetative production in Türkiye. Due to its rich geographical and climatic characteristics, Türkiye has products ranging from grains to oil seeds, as well as various horticultural plants ranging from fruit to vegetables. Fertile soils, favorable precipitation and climatic conditions allow for the cultivation of all kinds of plants.

While Türkiye increases the exports of agricultural products, it has become one of the largest agricultural producers in the world. Türkiye has increased agricultural exports 4 times in recent years with 1,690 kinds of products exported to over 190 countries. Türkiye is the world leader in the exports of hazelnut, cherry, fig, quince and apricot. With its volume of agricultural production, Anatolia plays an important role in the food safety at national and global level.

Some developments have been also observed in terms of livestock production in Türkiye. In the last 20 years, an increase of 300,000 tons in red meat production, an increase of 12 million tons in milk production, an increase of 1.8 million tons in poultry meat production and an increase of 6.6 billion in egg production have occurred.

In relation to red meat production in Türkiye, a rapid shift from traditional animal farming to modern systems occurs. In addition, fight against animal diseases contributes to animal farming activity and increases the number of animals. On the other hand, depending on the increase in income, meat consumption per person in Türkiye increases and accordingly, national meat production needs to be increased further.

Türkiye has also made significant progress on sustainable fisheries especially for the last 20 years. An important decrease in the number of ships belonging to Turkish fishing fleet, new regulations for fisheries management, certification and audit on fish farms, transfer of seine fishery in coastal areas to off-shore areas are some of main activities that have been undertaken so far. It is also necessary to take protective measures for the future to ensure the continuity of resources. Such measures are important not only at national level but also for the adaptation to international standards.

Turkish food and agriculture vision aims to provide reliable food supply through production and supply assurance, meet plant health, animal health and well-being requirements, improve agricultural infrastructure and rural development, effectively manage water products and fishery resources, promote research and development and improve institutional capacity.

One of the most important factors to promote sustainable food systems is undoubtedly innovation, research and development. Türkiye attaches particular importance to the scale-up, promotion of the use of new technology in agriculture in Türkiye and investment in this topic. Therefore, the production of species such as tea, banana, citrus, lemon, hazelnut, orange, grapefruit and tangerine, which are not specific to Anatolia, has been initiated with the efforts of Turkish researchers. Also, Research Institutes have been working on seed improvement and have registered many national seed varieties for grains, oil crops, vegetables and fruit. Many seed companies have been established and a large number of new varieties have been registered. New technologies in seed production are another development in R&D.

Unlike many countries in which agriculture is important in total foreign trade, the production and importance of genetically modified food products are not allowed in Türkiye.

In recent years, agricultural policies that focus on consumer and producer welfare have started to become prominent. In addition, environmental protection policies that take into account the welfare of future generations have entered into force. It is obvious that agriculture is no longer a family business or a sector that is defined with small farmers. Therefore, it is inevitable that the roles of traditional agricultural producers or traders will expand and change in Türkiye.

This report aims to reflect Türkiye's current situation on sustainable food systems and its activities to promote the food security that is further strengthened. Türkiye has strengthened its institutional, technological and legal infrastructure for the development of sustainable food systems and improved its investment capacity in infrastructure and human resources. Türkiye also emphasizes its willingness for further international cooperation.

Considering the current initiatives taken by Türkiye, it is observed that there are two important milestones that should be highlighted. The first important initiative is related to food loss and waste. Türkiye attaches a special importance to the reduction and prevention of food losses and waste, as a part of sustainable food systems. To this end, Türkiye implemented the Campaign for the Prevention of Bread Waste that was launched by the President of the Republic of Türkiye, Recep Tayyip ERDOĞAN on 17 January 2013 to create social awareness for the prevention of waste at production and consumption stages. The campaign was shown as an example of good practices around the world by FAO in 2014. Türkiye has also launched a new international campaign called "SAVE YOUR FOOD" in cooperation with FAO to reduce food loss and waste on a national and international scale.

The second initiative is related to afforestation. In order to protect our forests which are of great economic, ecological and social importance, manage them in a sustainable manner and make our country healthier and more livable for future generations, November 11 was declared as National Afforestation Day by the President Recep Tayyip ERDOĞAN in 2019. In the 1st year of this national day, approximately 13.5 million saplings were planted on the same day with the support of our nation although 11 million saplings were aimed to be planted. The campaign called Breath for the Future was promoted on an international scale in 2020. According to OECD data, Türkiye ranks 3rd in the increase in forest areas in the world.

Apart from the above-mentioned initiatives, Türkiye attaches utmost importance to international cooperation. Due to Türkiye's power in agriculture, Turkish food and beverages sector constitutes one of the most attractive areas for foreign investors. Since this investment area was profitable for global

investors, foreign direct investment of 7,354 billion USD was made in this sector in 2019. Total investment amount was 96.8 billion USD between 2010 and 2019.

The information and experience gained by taking account of the importance of international cooperation in achieving sustainability objectives are shared with region ranging from Central Asia to the Balkans, Caucasia and Africa through partnership programs conducted with international organizations.

Our position in the Syrian refugees that the World has been facing in recent years is a concrete example of Türkiye's conscious behaviour on the importance of international cooperation in relation to world issues. Türkiye hosts the largest refugee population in the world. The number of Syrians under temporary protection reached approximately 3.7 million in 2021 and almost half of them are children.

As one of the member states of the UN, Türkiye shares a widespread agricultural and economic diversity. While climatic and environmental characteristics are strong aspects for some of them, they constitute vulnerable points for others. Financial power, economic harmony, logistic advantages are the richness of large Muslim geography. In this century, quantity matters but quality has gained importance than ever before. To this end, it is necessary to support countries in terms of cross-country investments and strengthen cooperation through information exchange. It should not be forgotten that it is necessary to mobilize the resources for cooperation, which will help to achieve economic, social and environmental goals for the country.

Following the outbreak of COVID-19 pandemic, the fact that countries tend towards policies that restrict the agricultural trade and global disruptions experienced in the logistics of raw materials, intermediate products and products have revealed the importance of self-sufficiency once again. It is important to resolutely maintain the policies for sustainable agricultural production in which input costs in agricultural production are reduced and the welfare of producers is ensured, final product is provided to consumers at reasonable prices. Therefore, it is thought that approaches for maintaining the production in favourable cultivable lands and fallow areas to increase agricultural production, increasing the efficiency and producing imported products in our country are important.

In the current situation, there is a high uncertainty and unpredictability and it is considered important to maintain the policies for reducing the pressure of food prices for sustainable and accessible food on inflation due to the continuation of stock sensitivity in agricultural commodity, possible upward price movements due to global demand increase after the pandemic, the production pressure observed due to unfavourable weather conditions which result from climate change in many different regions of the world, cost increases that may result from failures and disruptions to supply chain.

Türkiye did not have any difficulty with food supply during the COVID-19 pandemic. To maintain agricultural production uninterruptedly, Türkiye operated the participatory process on a national and local scale with a visionary approach and took many measures in cooperation with many institutions and organizations in a timely manner. Türkiye succeeded to minimize the impacts of COVID-19 pandemic on food and agricultural sectors.

One of the important tools is school nutrition programs in ensuring food safety and ensuring everyone's access to healthy and nutritious food. These programs will also contribute to the decrease in nutrition-reduced diseases which children and the youth are exposed to. According to the 2019 results of TURKSTAT Health Research, the rate of obese individuals aged 15 and above was 19.6% in 2016 and 21.1% in 2019 in the country. This rate is 24.8% for women and 17.3% for men. According to Research Report on the Project on Monitoring of Growth of School-Age Children in Türkiye of "Action Plan for the Prevention of Adulthood and Childhood Obesity and Physical Activity (2019-2023) " prepared by the General Directorate of Public Health, it is stated that it has been identified that 14.3% of children aged 6-10 are overweight and 6.5% of them are obese across Türkiye. These rates reveal the emergency of healthy nutritional habits for children and the youth. At national level, the Ministry of Agriculture and Forestry and Ministry of Health, especially the Ministry of National Education deal with the topics related to school nutrition, school food. There are school meal practices in certain regions and schools in Türkiye. Developing and maintaining these practices and supporting school nutrition programs at national and global level are considered important for the achievement of the objectives of food systems and their inclusiveness.

For the improvement of Sustainable Food Systems, in addition to the actions of the 3rd Agriculture Forest Council, among others, on a national scale, the following topics will be concentrated:[115]

- **Protection of Environment and Natural Resources and Sustainable Use of Them** by combating climate change, using our water resources efficiently and preventing the pollution, ensuring the sustainability of our natural resources
- **Transition to Sustainable Consumption and Prevention of Food Loss and Waste** by reducing food loss and waste
- **Ensuring Public Health and Food Safety** by producing reliable, healthy and nutritious food, strengthening audits and controls on ensuring public health and food safety, addressing other topics related to food safety
- **Inclusive Sustainable Food Systems and Poverty Reduction** by mitigating rural-to-urban migration, developing fair livelihoods, improving income distribution for the poor
- **Increasing the Resilience of Sustainable Food Systems against Food Crises** that require intervention both on a national scale and international scale.

For the improvement of Sustainable Food Systems,

In conclusion,

Efforts are made to implement many measures[116] in the next period such as:

- Providing healthy nutrients and safe food at reasonable prices
- Reviewing measures against income loss and disruptions to food supply due to loss of livelihoods as a result of COVID-19 and strengthening food safety for other emergencies, ensuring supply resilience against the future crises
- Ensuring the efficiency and sustainability of agricultural production through innovative methods, improving sustainable food systems through reliable food supply and healthy consumption
- Taking measures that will prevent price fluctuations
- Sustainable use and management of natural resources with an approach that also considers water usage for agricultural purposes
- Ensuring the sustainability in agriculture and protecting competitiveness by minimizing the impacts of climate change and drought, strengthening climate change adaptation, water management and environmental resilience
- Using and promoting renewable energy resources in agriculture
- Taking measures that will strengthen producers, especially small-sized enterprises with an approach that considers gender-sensitive and disadvantaged groups, defining new funding models at production, processing, logistics, retail level
- Reducing, preventing and managing loss and waste at consumption level in food supply and supply chain
- Accelerating digital transformation in agriculture by developing innovative management models, cooperation and R&D infrastructure
- Implementing School Nutrition, School Milk and School Food Programs
- Developing and diversifying decent job opportunities in rural areas and in the agricultural and food sectors with an approach that considers vulnerable groups
- Employment of the youth in the agricultural and food sectors and prevention of rural-to-urban migration
- Developing land property, land banking and community-based mechanisms
- Promoting e-commerce practices for virtual marketing (DITAP-Digital Agriculture Platform)
- Improving small farmers', cooperatives' and small enterprises' access to funding
- Promotion of One Health approach

115 Detaylar için ayrı bir belge halinde sunulan sonuç raporu incelenebilir.
116 Solution proposals and actions are summarized

ANNEX

Table 81. Agriculture and Food Exports, by Country (Forestry and Timber) (TURKSTAT, 2019)

		Country	Export USD	Country	Import USD
Forestry and Timber	1	Germany	5,438,266	India	8,494,854
	3	Iraq	4,389,820	Germany	8,429,904
	4	Netherlands	3,690,784	China	7,046,341
	5	Italy	3,356,416	France	6,669,157
	6	China	2,623,390	USA	5,004,552
	7	Syria	1,654,757	Italy	3,922,316
	8	South Korea	1,456,554	Philippines	3,806,173
	9	USA	1,403,242	Ireland	3,471,702
	10	Malaysia	1,144,004	Spain	3,318,229
	11	France	1,063,438	Cameroon	2,560,751

Table 82. Agriculture and Food Exports, by Country (Agriculture and Livestock) (TURKSTAT, 2019)

		Country	Export USD	Country	Import USD
Agriculture and Livestock	1	Russia Federasyonu	826,406,585	Russian Federation	1,745,496,233
	3	İtalya	650,176,908	Brazil	1,136,919,810
	4	Germany	506,517,466	Ukraine	1,083,222,360
	5	Iraq	413,561,844	USA	839,347,038
	6	Ukrayna	194,001,261	Romania	331,328,874
	7	Romanya	146,869,959	Greece	313,501,700
	8	Suriye	142,233,531	Canada	295,317,723
	9	France	139,872,925	Uruguay	228,358,340
	10	Polonya	132,046,200	Moldova	207,091,248
	11	ABD	130,532,575	Cote d'Ivoire	178,306,234
	17	Netherlands	128,112,415	Mexico	164,599,450

Table 83. Agriculture and Food Exports, by Country (Fisheries) (TURKSTAT, 2019)

		Country	Export USD	Country	Import USD
Fisheries	1	Japan	69,120,853	Norway	37,639,522
	3	Italy	61,100,594	Libya	4,736,040
	4	Greece	53,306,273	Egypt	2,964,713
	5	Netherlands	50,378,077	Morocco	1,432,449
	6	Russian Federation	49,461,537	Ireland	766,433
	7	Spain	34,687,983	Syria	714,249
	8	USA	27,620,699	Greece	516,162
	9	United Kingdom	25,281,110	Bulgaria	364,857
	10	Lebanon	23,350,490	Ukraine	339,939
	11	BAE	16,913,438	France	295,252

Table 84. Agriculture and Food Exports, by Country (Food and Beverages) (TURKSTAT, 2019)

		Country	Export USD	Country	Import USD
Food and Beverages	1	Iraq	1,923,053,842	Malaysia	558,930,490
	3	Germany	884,103,377	Russian Federation	494,537,764
	4	USA	641,331,734	Netherlands	291,030,987
	5	United Kingdom	453,148,005	Germany	234,868,570
	6	Syria	427,372,703	Ukraine	203,461,008
	7	Netherlands	386,744,386	Bulgaria	179,804,654
	8	Saudi Arabia	349,543,655	Argentina	155,772,626
	9	Yemen	303,052,633	Italy	146,706,885
	10	Italy	236,147,610	Morocco	135,890,049
	11	France	230,104,127	France	127,163,923

Table 85. Agriculture and Food Exports, by Country (Tobacco Products) (TURKSTAT, 2019)

		Country	Export USD	Country	Import USD
Tobacco Products	1	İran	100,479,985	Netherlands	74,345,776
	3	Iraq	75,930,906	Germany	24,542,612
	4	Bahrain	64,528,169	Russian Federation	19,354,855
	5	Saudi Arabia	52,609,153	United Kingdom	16,932,385
	6	Israel	33,767,751	France	13,221,559
	8	BAE	29,739,018	Malaysia	2,991,282
	10	Morocco	27,238,547	USA	2,112,767
	11	Malta	26,814,541	Italy	1,858,688
	17	USA	19,444,370	South Korea	1,013,531
	18	Northern Cyprus Turkish Republic	13,026,665	Poland	342,507

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