

## General Analysis of the Recent Changes of Barley Productions and Consumptions in Turkey

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**Abstract:** Barley is a one-year plant mostly cultivated in semi-arid and semi-humid areas and is produced for animal nutrition, malt production and, to a lesser extent, human food, and is cultivated almost everywhere in the world. While Turkey is a self-sufficient and exporter country in barley production in the past years, nowadays Turkey is an importer. This situation had the highest negative impact on animal husbandry. The aims of this study to make an overall assessment of the acreage of emerging barley agriculture, productivity, sales prices and foreign trade of Turkey based on the data of the years between 2004 and 2018 and to do the projection for 2023, depending on the available data. In this context, TUIK and FAO data are used and related sector reports with other studies were utilized. The trend analysis shows that the decrease in barley production areas with production amounts and the increase in imports with prices will continue in Turkey. Accordingly, it is expected to continue to increase in Turkey's foreign trade balance deficit in barley. Barley cultivation areas should be expanded for this it is necessary to increase the amount of agricultural supports given to barley, to develop new varieties with high quality and high yields, to expand farmers' training and barley should be provided in crop pattern in irrigated agriculture. Additional public policies and support are needed to expand the cultivation areas of barley. This research provides useful data to decision-makers and agricultural policymakers.

**Keywords:** Barley, Cultivation areas, Foreign Trade, Production amounts, Prices, Turkey.

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### I. Introduction

Barley; It is a one-year plant with a cool climate grain that is cultivated globally within the family of wheat [1]. It is cultivated mostly in semi-arid and semi-humid areas around the world. Barley is one of the grains consumed as animal nutrition, malt production and a small amount of human food [2]. It has been used in human nutrition especially during the years of war and famine, and today it is mostly used in animal husbandry globally [1]. Barley cultivation is primarily carried out for malt production in developed countries, especially in the EU and USA, and for animal feed and less human nutrition in developing countries [2]. There is almost no country in the world without barley cultivation. According to the 2017 FAO data [3], the first 21 countries in terms of barley cultivation areas in the world are given in Figure 1.

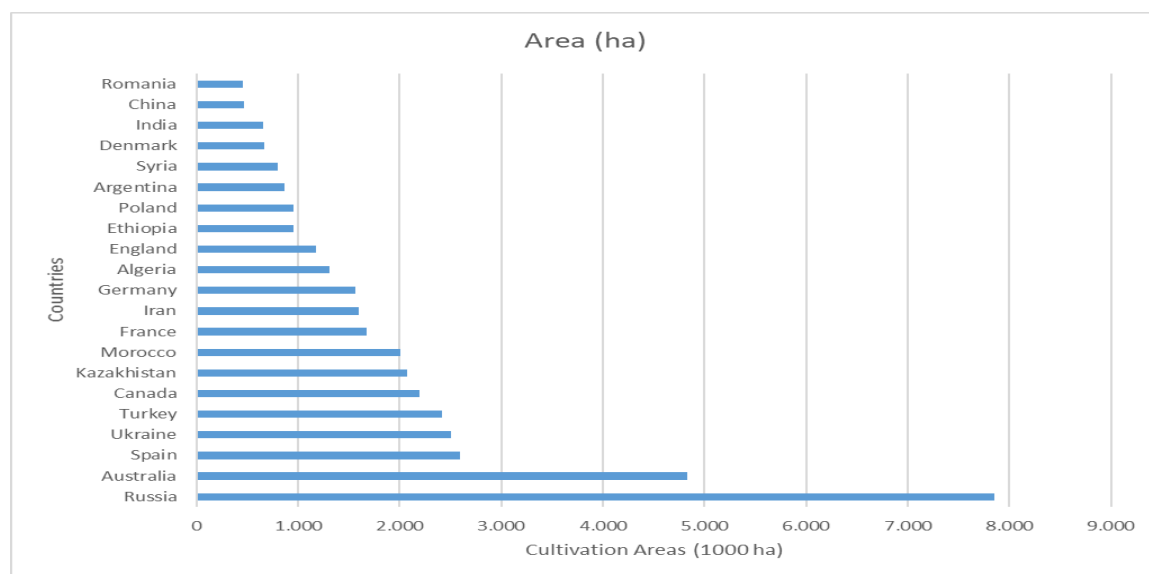


Figure 1. Top 21 countries with the highest barley plantation in the world.

Accordingly, most barley is sown in the Russian Federation in the world, Turkey is ranked fifth in the world in terms of cultivating area. The last five countries with the least production area are Montenegro by 400 hectares, Bangladesh by 329 hectares, Qatar by 217 hectares, the United Arab Emirates by 16 hectares and Guatemala by 10 hectares respectively. FAO data for 2017 indicate that official barley data on Taiwan, Myanmar, and Rwanda are not available [4]. The direction of the barley cultivation areas in Turkey ranks second after wheat. Barley can be grown in all regions of Turkey which is a product that is consumed within the country. Barley is used in animal husbandry by approximately 90% due to the rich nutritional value in Turkey which contains 9-13% of crude protein, 67% carbohydrate, and 75% digestible nutrients in terms of nutrient content [1,5]. Turkey has a long history and culture of barley cultivation and has agricultural accumulation with gene diversity. However, Turkey has come to the position in barley importer in recent years, this situation has also adversely affected the livestock sector. Turkey was a high animal husbandry potential in the past, but it cannot be said to have this feature today. While Turkey was a livestock exporter in the past, it has become an importer today. One of the reasons for this is the excessive and irregular grazing of meadows and pastures for many years [1] and also reduction of barley cultivation areas, too. It can be said that there is a linear relationship between the barley fields and livestock in Turkey. The increase in barley cultivation areas positively affects livestock. Considering the situation of the livestock sector today; In order to ensure the full potential utilization of the livestock sector which has great economic potential and to revive the livestock sector, improvement of meadows and pastures and fodder barley production in fodder crop production should be improved. The aim of this research to evaluate the general analysis of the changes that occur in barley production areas, production amounts, yields, import, export, price, and make suggestions based on between the years 2004 and 2018 and evaluations for the years until 2023 which is the 100th year of the Republic of Turkey.

## II. The Materials and Method

In this researched, the Statistical Institute of Turkey (TUIK) [6] and Food and Agriculture Organization of the United States (FAO) [3] data are used. In addition, other studies and researches on the subject have been used to interpret the results. Trend analyses were created in Excel and then interpreted according to the slope and the regression coefficients.

## III. Results And Discussions

In Turkey, there were 3.6 million decares of the barley acreage in 2004, depending on the years with a changing increasing and descending a slope but mostly decreasing, declined to 2.6 million decares in 2018. The graph of change of barley cultivation areas in Turkey is given in Figure 2. There was a 27.4% decrease between the beginning and the end of the investigated period in cultivation areas in Turkey.

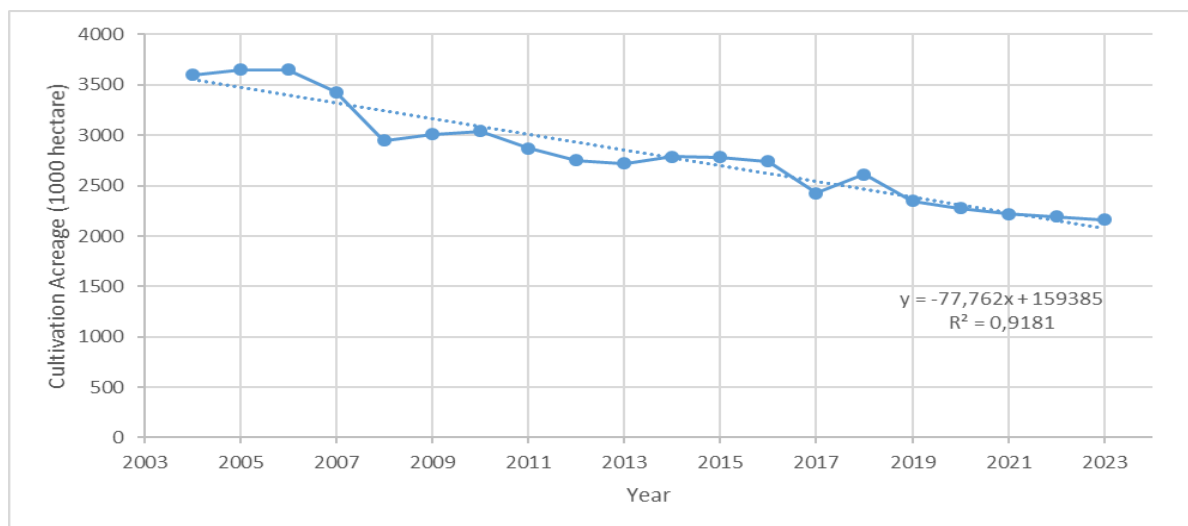


Figure 2. Barley acreage trend analysis between the years 2004-2023 in Turkey

Accordingly, barley acreage in Turkey showed a rise in between the years of 2004 and 2006. Among this year's, it also showed a rise in the number of animals in Turkey, too. Where the total number of animals was 41.9 million heads in 2004 and the number of animals had reached 43.2 million heads in 2006 [7]. These data explain the connection between the increase of barley cultivation areas and the livestock sector in the mentioned years. The decrease observed in barley cultivation areas in 2007-2008 was also manifested in the presence of animals and there was a decrease up to 37.7 million head animals [7]. The fluctuations in barley cultivation

areas since these dates have also been observed in the presence of animals. The analysis of projections up to 2023 shows that there will be a decreasing trend in barley acreage in Turkey with a regression coefficient of almost 92%. This high regression coefficient confirms this prediction. Depending on the years, the cultivation areas decreased while the yield increased. The yield, which was 2500 kg/hectare in 2004, increased and decreased at a fluctuating rate and reached 2680 kg/hectare in 2018. In the researched period, yield increased by 7.2% from 2004 to 2018. There are many factors that affect yields in agriculture, such as climate, irrigation, soil maintenance, quality seed, fertilizer and education. It is predicted that rainfall, agricultural technologies, high-quality seeds and inputs are effective in this increase in yield. The graph of change of barley yields (kg/hectare) in Turkey is given in Figure 3. Accordingly, although with an increasing slope in the direction of barley yield for the years 2004-2006 in Turkey, there has not been a big change. After 2006 to 2009 there was a decreasing in yields. Rainfall was effective in this decrease in yield. In Turkey, there has been less than normal rainfall of 15.5% in 2006. 18.0% decrease is observed when compared to June 2005 [8]. Turkey shows a decline in barley yields between the years 2006-2008, too. The rainfall in 2008 was generally less than normal years. The average rainfall was 504.1 mm in 2008, where long term normal is 652.2 mm. According to the normal rainfall, 22.7% decrease is examined [8].

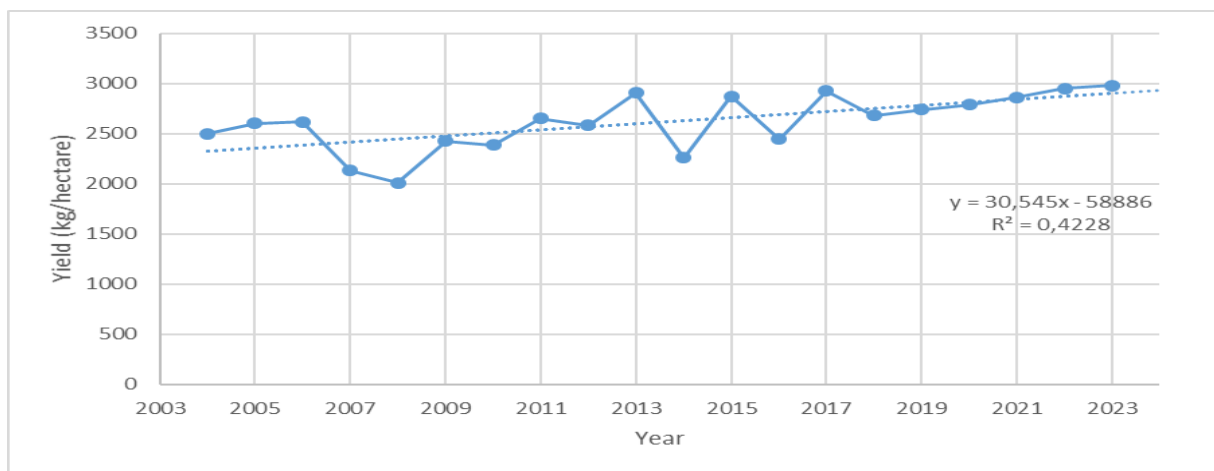


Figure 3. Barley yield trend analysis between the years 2004-2023 in Turkey

The fluctuating change in yield is explained by climatic conditions and precipitation. Because barley is mostly carried out in dry farming conditions in Turkey. The projections made until the 2019-2023 year, the increase is expected to be in the least amount of barley production in Turkey with a regression coefficient of 42%. The data for the years between 2004-2018 [9] are used in order to estimate the change and future projections for the average selling price of barley in Turkey. Based on these data, trend analysis has been carried out until 2023 and is shown in Figure 4.

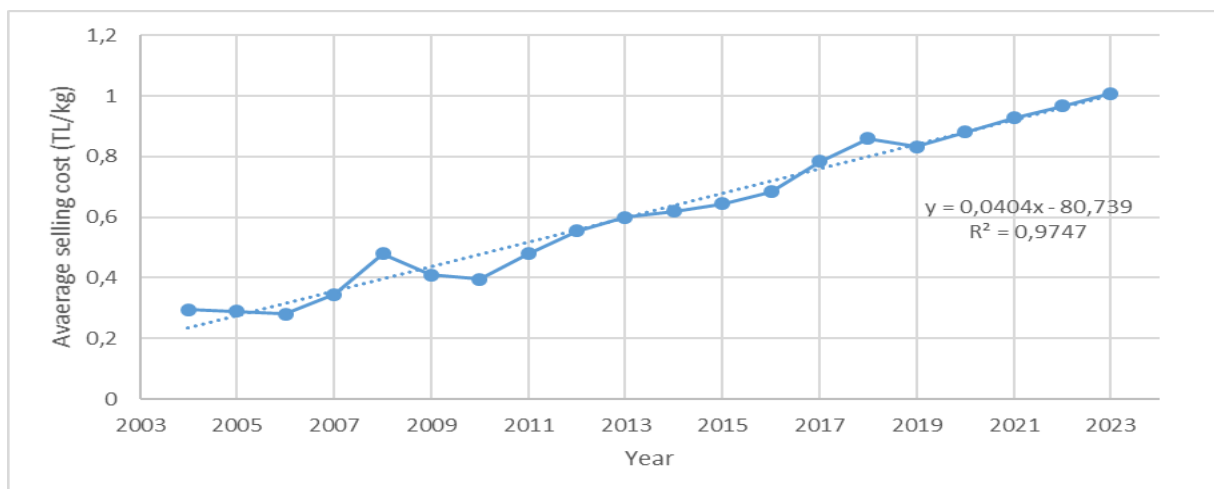


Figure 4. The average selling price of barley's trend analysis between the years 2004-2023 in Turkey

In Turkey, between the years of 2004-2018 barley sales prices generally showed a rising slope. This increase in prices is explained by a 22.2% decrease in barley production. This is to be expected as prices are dependent on supply and demand under general economic conditions. It is expected that prices will increase as the amount of supply decreases. Prices increased by 292% as of the beginning and end of the research period. According to the trend analysis, it is predicted that barley prices will be in an increasing trend until 2023 with a regression coefficient of almost 98%. Turkey poses a variable appearance of foreign trade in barley but mostly as an importer. The import amount of barley varies according to years, depending on the production areas and amounts, domestic use and the amount of raw materials to meet the evolving needs of the feed industry in Turkey. Based on the data of 2004-2018, the trend analysis performed until 2023 and is given in Figure 5. Increases and decreases in the amount of imports are mostly explained by cultivation areas, yield and climate-based precipitation. This is directly related to the presence of animal numbers which is livestock where Turkey is the net importer in red meat [10]. Due to the insufficiency of red meat and the high price, there was a shift towards poultry meat in Turkey [11]. Imports are increasing due to the increase in the number of animals. Because the cultivation areas are in a continuously decreasing slope.

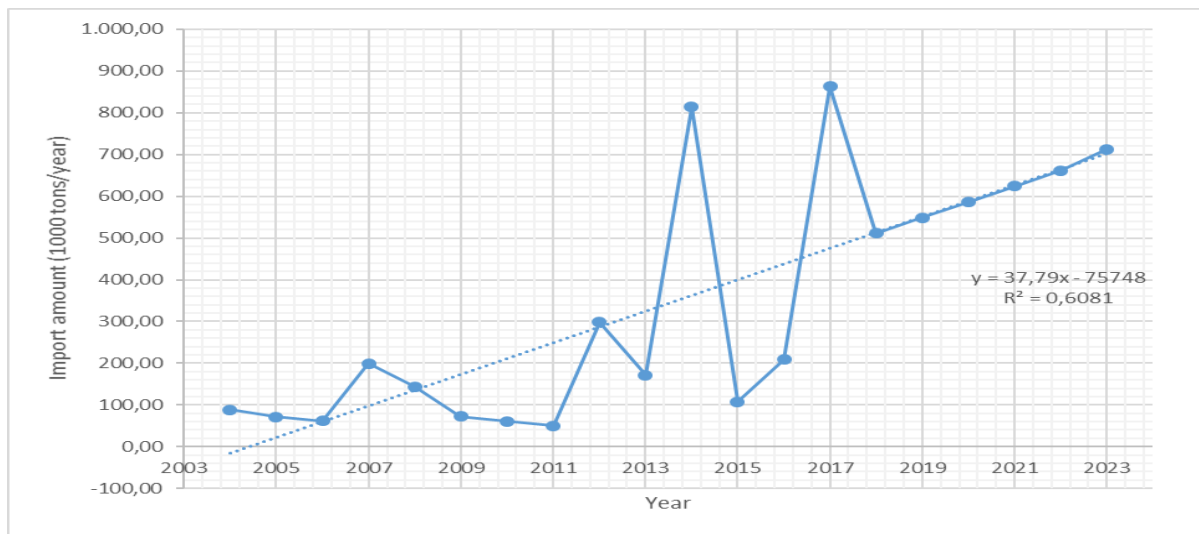


Figure 5. The trend analysis of the import amount of barley between 2004-2023 years' in Turkey.

According to the trend analysis, barley imports are expected to increase by 2023 with a regression coefficient of almost 61%. The increase in the amount of imports is explained by the increase in the amount of consumption. The increase in consumption is due to the decrease in cultivation areas, use as feed-in animal husbandry and an increase in use in other food and beverage sectors. The data for the years of 2004-2018 were used to determine the change in the foreign trade balance in Turkey by years for barley and to estimate future projections. Based on these data, trend analysis was performed until 2023. The graph of analysis is given in Figure 6.

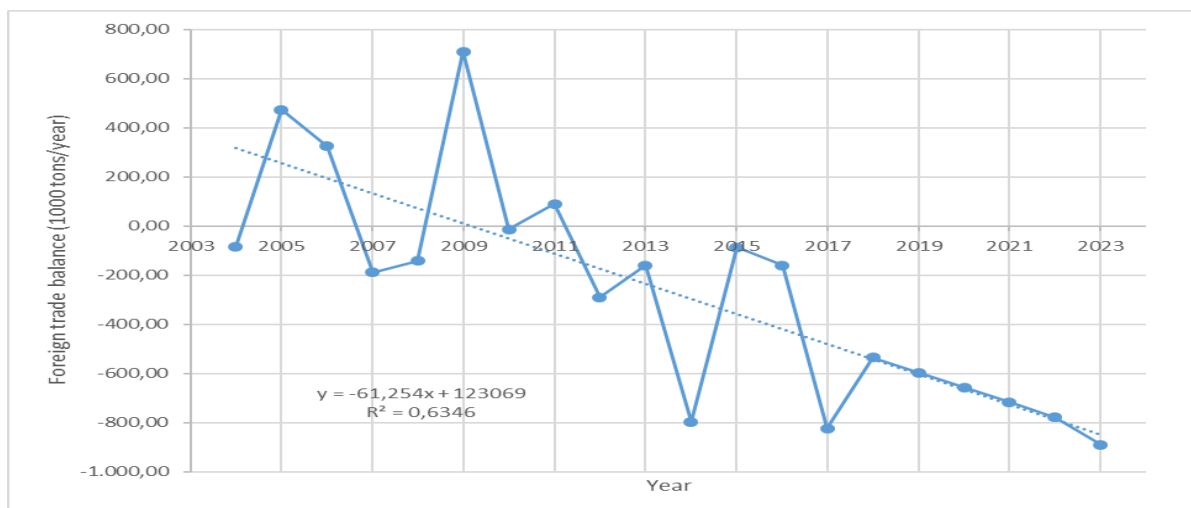


Figure 6. The trend analysis of foreign trade balance of barley from 2004-2023 years in Turkey.

In its simplest definition, the balance of foreign trade is the difference between an import of goods and services and that export of goods and services [12]. Turkey is mostly importer in barley during the researched period. Turkey, on average, produces 5% of world barley production. Nevertheless, due to global droughts and increasing in demand, Turkey is an importer in the foreign trade balance. Global barley production for the period 2018/2019 is expected to decline to 141 million tons, the lowest level of the last 6 seasons as a result of the decrease in average yields in the Black Sea region, EU countries and Australia due to drought in the summer months. Due to the decrease in global barley supply and high price, feed barley use is estimated to decrease to 96 million tons [13]. According to the trend analysis, the import ratio will continue to increase until 2023 with a regression coefficient of almost 64%.

Since barley is grown in dry farming conditions, it is not a competitive product compared to crops produced in irrigated agriculture. Turkey to move away from the position of the barley importer, it is necessary to increase the amount of agricultural subsidies given to barley. 2019 barley support policies in Turkey are as follows; field-based diesel support is 190 TL/ha, (Turkish Lira/hectare = TL/ha), fertilizer support 80 TL/ha, domestic certified seed usage support 85 TL/ha, and difference payment support 0.05 TL/kg [14]. Between 2017-2019, the increase in diesel fuel support was 46.15% and the increase in fertilizer was 100%, with no change in domestic certified seed usage support and difference payment support in Turkey. On the other hand, the prices of these inputs increased much more than the rate of increase in support. The amount of agricultural support in Turkey is very effective on farmers' decisions on which crops they will cultivate [15].

#### IV. Conclusion

Barley is one of the basic raw materials for the food and feed industry in the world and Turkey which is a key grain variety in agriculture and barley is the second most cultivated product after wheat in Turkey [16]. Barley is an important agricultural product due to its wide usage areas and its ability to grow in every region of Turkey. The number of animals is expected to increase due to long-term trend analysis [10], while barley cultivation areas are expected to decrease in Turkey. Turkey is an importer country nowadays while an exporter country in past in livestock. Another factor that adversely affects animal husbandry is the lack of support for forage crops [17] and insufficient public policies. As a natural consequence, Turkey's barley imports and trade balance on this issue will increase the deficit. The trend analysis shows that the decrease in barley production areas and production amounts and the increase in imports and prices will continue. Accordingly, it is expected to continue to increase in Turkey's foreign trade balance deficit in barley.

This research is also important in terms of addressing barley which is an important forage plant in cereals group and covering current data. Barley cultivation areas should be expanded to prevent this condition. In order for barley to be widely included in the crop pattern again, it is necessary to increase the amount of agricultural supports given to barley, to develop new varieties with high quality and high yields, to expand farmers' training and barley should be provided in crop pattern in irrigated agriculture. Additional public policies and support are needed to expand the cultivation areas of barley. This research provides useful data to decision-makers and agricultural policymakers.

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