Apricot production forecast of the leading countries in the period of 2018-2025

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A B S T R A C T

The aim of this study is to estimate apricot production quantities in 2018-2025 periods by using 1961-2017 data of the leading countries in apricot production in the world. 57-year data were obtained from FAOSTAT and analyzed with the help of the SAS 9.4 statistics program. In order to determine these predictions, ARIMA models have been used. In cases where the data is not stationary, the one-year delay was made and the most suitable ARIMA model was chosen according to AIC, BIC, SSE, MSE, MPE criteria. According to the 8-year average estimation based on 26 years of data, the share of countries in apricot production is formed by Turkey with 19%, Uzbekistan with 14%, Algeria with 7%, Iran with 6%, and Italy with 6%. Turkey ranked second after Spain in fresh apricot exports and first in the dried apricots although dried apricot export prices are less than Germany price currently, the government focusing on higher-quality types in fresh and dried apricots, France, and the Netherlands supplied dried apricots from Turkey.

Keywords: Apricot; ARIMA Model; Competition; Turkey

INTRODUCTION

866 million tons of products were obtained from 40 fruits in the world in 2017. As percentage distribution of products (watermelon, banana, apple, grape, and orange) in this production quantity constituted of 13.7, 13.2, 9.6, 8.6 and 8.5, respectively. Also, apricot takes 25th place among 40 fruits and its share in world production was 0.49 percent. 27 of these 40 fruits were produced and they have obtained 21.8 million tones products in Turkey in the same year. 18.1, 17.3, 13.1, 8.4, and 7.8% of fruit production constitutes grapes, watermelon, apple, orange, and melon in Turkey, respectively. Considering the total production amount of 27 fruits grown in Turkey, apricot ranks 8th with a share of 4.3 percent (FAOSTAT, 2020).

The homeland of apricot is vast geography including Central Asia and Western China and it is grown in many countries entered the temperate climate zone of the world (Topcu and Uzundumlu, 2010; Karaat, 2018; Ucar and Engindeniz, 2018). In terms of spreading areas, apricot is produced with nine species known in six eco-geographic regions: Central Asia, North and East China, Dzhungar-Zailij, Iran-Caucasus, and Europe (Faust et al., 1998; Hormaza, 2002). Turkey is taking part in the Iran-Caucasus eco-geographic subgroups that area *Armeniaca L. Prunus* species are grown (Karaat, 2018).

Apricot contains vitamins A, B1, B2, C, and E as well as Ca, Fe, Na, P, K, Mg minerals, and it is a very important food in human nutrition with its low fat and carbohydrate content (Batu et al., 2007; Karatas and Kamisli, 2007).

Apricot cultivation areas have nearly tripled since 1961. While apricot production is in a general upward trend, significant decreases were experienced in the 1990s. For this reason, there were high fluctuations in apricot yield in the 1990s (Topuz et al., 2018). Crop frost damage is one of the biggest natural disasters that cause serious economic losses in the world, especially in the production of fruits such as apricots, plums, pears, cherries, grapes, and walnuts (Ding et al., 2018). The emerging climate change today will create challenges to sustain early maturing apricot production. The future will require the release and development of varieties that require lower cooling, as well as chemical methods to break dormancy (Egea et al., 2020). Due to the increase in

demand for apricot varieties with different characteristics such as color, taste, pleasant smell, and size, which have recently occurred in consumer preferences, studies on breeding new varieties with high fruit quality have gained importance (Çuhacı et al., 2020).

Turkey is the number one in the world production in terms of both fresh and dried apricot production. Asian countries such as Iran, Pakistan, Afghanistan, Uzbekistan, Tajikistan generally produce for drying and European countries such as France, Spain and Italy generally produce for the table (Aydogdu 2016).

Apricot production was made in 42 countries in 1961 and leading countries are the United States, Soviet Union (USSR), Hungary, Turkey, Spain, France, Italy, and Iran, respectively. Apricot is produced in 69 countries in 2017 and Turkey, Uzbekistan, Italy, Algeria, Iran, Pakistan, Spain, France, and Afghanistan are leading countries (FAOSTAT, 2020).

Time-series studies on apricot are very few and only two of them is for production prediction. The studies on production estimation were carried out by Topuz et al., (2018) and Karabacak and Uzundumlu (2020). They have been identified respectively, ARIMA (2,1,1) and ARIMA (4,1,1) model as the most appropriate model for Turkey. According to them, Turkey's average apricot production amount will be 648,121 and 780,000 tons and that will not be enough for domestic and external demand.

In some studies, estimations were made to determine the factors affecting yield. Bartolini et al. (2018) investigated the effect of climate trends on apricot bloom during the 1973-2016 period in Italy. In the study, the relationship between flowering and climate parameters was revealed by statistical analysis as ANOVA, student t-test, and regression analysis. They said that significant effects will be seen in the future with the irregular autumn-winter cold rate in recent years, and they predicted that apricot growing areas will be the shift from northern Italy and European regions to more potentially suitable areas. Also, Esfandiarpour-Boroujeni et al. (2019) tried to estimate apricot yield and the efforts of factors affecting it in the Yazd province of Iran. The yield of 110 apricot orchards was randomly selected through the survey and 61 variables that may affect the yield was analyzed. In MATLAB software, they determined that out of 61 variables, 18 variables were the most effective in apricot yield. They determined that the productivity index has a high effect on estimating apricot yield.

In some studies, estimations have been made to determine the price and the export amount of fresh or dried apricots.

The price and export quantities that are positive and negative affected by many variables have been identified in the other studies. Gunduz (2010), has tried to reveal the relationship between exchange rate volatility and export value of dried apricots in Turkey have tried to reveal. By analyzing the data covering the period 2003-2008 obtained from the Anatolian Exporters Union through the Vector Auto-regression (VAR) model, he has determined that the volatility in export values is 20% dependent on the exchange rate. Also, he has foreseen that apricot export revenues can be increased through stable exchange rate policies. Demirel et al. (2017) tried to determine the price changes in the world dried apricot market. In the study, the monthly data of 2006-2015 of getting by various institutions and organizations were analyzed with the Generalized Autoregressive Conditional Variable Variance (GARCH) model. They have determined that a one-percent change in the price of dried apricots in Turkey is causing the exchange in the rate at a lower than one percent in the world. They suggested that it is important for the dried apricot to be permanent to the foreign market by performing processes such as storage and packaging under the most favorable conditions. Dellal and Koç (2003), are intended to create a supply and demand model from production and export data dried apricots of Turkey in the 1976-2000 period. The elasticity of long-term supply, price-yield, and export of dried apricots calculated 0.72, 0.54, and -0.87 respectively. They found that the demand elasticities of dried apricots for the target countries are not flexible.

This study aims to determine percentage changes of apricot production of leading countries in the last 8 years and determining world apricot prices. Also, it emphasizes how Turkey's strategies should develop against rival countries in fresh and dried apricots exports.

MATERIAL AND METHOD

In the study, data obtained from FAO (Food and Agriculture Organization) statistical source was used as secondary data. Besides, many national and international studies, as well as papers, books, internet resources and conferences, product reports, master's thesis, and doctoral dissertations, have been used in this study.

ARIMA models were used in determining the production quantities of the leading countries in apricot production from 2018 through 2025. While 57 years of data (1961-2017) were used for leader 10 countries, 26 years of data (1992-2017) was used for Uzbekistan. Such as AIC, BIC, SSE, MSE, and MPE criteria were used for the best estimation was and analyses made with the SAS 9.4

statistical program. ARIMA model analyzed for each country and world total by considering separately.

ARIMA models

One of the analyzes that make predictions with time-series data is the ARIMA model. ARIMA model is called Box-Jenkins and estimates against a single variable of time series data (Box et al., 2016; Ramakrishna and Kumari, 2018). This model can be successfully applied to both stationary and non-stationary time series (Yildirim, 2019). These models are divided into 3 as stationary (ARMA), non-stationary (ARIMA), and seasonal (SARMA) (Box et al., 2016). When non-seasonal models are not stationary, ARIMA is shown as (p, d, q), whereas when it is stationary (since d=0), the model is expressed as ARIMA (p, 0, q) or ARMA (p, q) (Akgul, 2003; Mech, 2017; Yildirim and Alkan, 2018). Here, p shows the degree of auto-regression model (AR), d shows the number of differences and q shows the degree of the moving average model (MA) (Mech, 2017; Yildirim and Alkan, 2018). If there is white noise in the series, it shows that this model is stationary and estimates are made as ARMA (p, q) without any delay (SAS, 2014). In cases where there is no white noise, the unit root research is carried out in the series with the Dickey-Fuller test, so the series is not stationary, therefore it is ensured that the difference of the first, second or third-order data is obtained and stabilized (Uzundumlu et al., 2018).

This situation is shown as follows (Yavuz et al., 2013; Uzundumlu et al., 2018).

$$d=0: y_t = Y_t \tag{1}$$

$$d=1: y_t = Y_t - Y_{t-1} \tag{2}$$

$$d=2: y_t = (Y_t - Y_{t-1}) - (Y_{t-1} - Y_{t-2}) = Y_t - 2Y_{t-1} + Y_{t-2} \tag{3}$$

Kadılar (2009) expressed to the ARIMA model as in the formula 4.

$$1-a\_1B^1-a_2B^2\ldots-a_P\,B^P)*(1-B)^d y_t = (1-\theta_1 B^1-\theta_2 B^2-\ldots-\theta_q B^q)\varepsilon_t \tag{4}$$

The term $(1-B)^d$ is difference process from the d^{nd} degree, $(1-B)^d\, y_t$ can be written for d=1 as $By_t = y_{t-1}$ Also, it can be written for d=2 as $B^2 y_t = y_{t-2}$ or $B^1 y_{t-1} = y_{t-2}$.

In order to make predictions with ARIMA, it is necessary to consider some features. These features are four (Hasmida, 2009; Kurtoglu, 2018):

1. Stability of the data should be checked with root tests, if there is no stagnation, stagnation should be ensured in delays in 1, 2 or 3 years,

2. It should be ensured that the data are suitable for normal distribution,

3. There should be no contradiction in the data and

4. There should be no deficiency in the value of any year in the data.

Some criteria are used to identify the best ARIMA models. The most preferred from them are Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) (SAS, 2014). In the study, firstly p and q values have been determined by SCAN and ESACF with ARIMA model in SAS 9.4 program. The most suitable ARIMA models that support the smallest BIC and AIC values were analyzed separately in the second stage, and p and q values were determined according to the most appropriate SBC, SSE, MSE, MAE, MAPE, RMSE, and DW results in the final.

RESULTS AND DISCUSSION

Apricot productions realized and predicted in worldwide in the period 1961-2025

The most important producer countries outside the USSR in apricot production are the USA, Spain, Turkey, in 1961-1980. Italy in the 1980s, Iran in the 1990s, Uzbekistan and Algeria in the 2000s have found their place among these four countries. Uzbekistan is the most important producer country among the USSR countries, it was in the top 4 after the 2000s, and it has got 20% and 60% apricot production of the USSR with its production in 1992 and 2017, respectively. While there had been 42-44 countries producing apricots in the 1960s, this number did not change much until the 1990s, but it had been produced in 69 countries around the world with the disintegration of the USSR after the 1990s. The market share was listed as concentration ratios $(CR_{1,2,3,4})$ in Table 1.

CR_1= the share of the first country in production (12.98%), (USSR)

CR_2= Share of first and second countries in total production (25.26%), (USSR and USA)

CR_3= Share of first, second, and third countries in total production (35.25%), (USSR, USA, and Spain)

CR_4= Share of these four countries in total production (42.13%), (USSR, USA, Spain, and Turkey)

Since CR4 is bigger than 40%, countries producing apricot in 1961-1970 produce in the Oligopoly Market.

Table 1: The status of leading countries according to the apricot production of realized and estimated in 10-year periods.

Years	HHI	CR$_1$	CR$_2$	CR$_3$	CR$_4$	Ranking of Leading Countries	Number of Countries
1961-1970	0.05	12.98	25.26	35.25	42.13	USSR, USA, Spain, Turkey	42-44
1971-1980	0.05	14.2	24.24	33.19	41.57	USSR, Spain, Turkey, USA	42-46
1981-1990	0.06	15.92	29.06	37.39	45.08	USSR, Turkey, Italy, Spain	47-49
1991-2000	0.04	13.56	22.16	29.29	35.72	Turkey, Iran, Spain, Italy	49-69
2001-2010	0.05	16.44	27.29	33.69	39.75	Turkey, Iran, Italy, Uzbekistan	69
2011-2017	0.06	18.00	31.07	38.56	45.56	Turkey, Uzbekistan, Italy, Algeria	69
2017	0.08	23.14	35.65	41.90	47.94	Turkey, Uzbekistan, Iran, Algeria	69
2018-2025*	0.07	19.52	33.16	40.16	47.02	Turkey, Uzbekistan, Algeria, Italy	69

Source: FAOSTAT, 2020.
Note: 1992-2017 years were taken into consideration in Uzbekistan production estimation.
* Estimation values made with ARIMA model
HHI: Herfindahl-Hirschman Index
CR1, CR2, CR3, CR4: condensation rates of 4 leading countries in apricot production

The HHI index for the years 1961-1970 was calculated as follows.

$$HHI = (MS_1)^2 + (MS_2)^2 + (MS_3)^2 + (MS_4)^2$$

$$HHI_{1961\text{-}1970} = (MS_{USSR})^2 + (MS_{USA})^2 + (MS_{Spain})^2 + (MS_{Turkey})^2$$

$HHI_{1961\text{-}1970}$ is accounted 466.41 for USSR: 12.98%, USA: 12.28%, Spain: 9.99% and Turkey: 6.88%

$HHI_{2011\text{-}2017}$ is accounted 599.93 for Turkey: 18.00%, Uzbekistan: 13:07%, Italy: 7.49 and Algeria: 7.00%

CR$_4$ is accounted for as perceptual 42.13 and 45.56 in 1961-1970 and 2011-2017, respectively. Since CR$_4$ is larger than 40%, countries producing apricots market their products in the Oligopoly Market.

19.52% of world apricot production will meet by Turkey and its share of first ranking in the world production will be continued in the 2018-2025 period. Turkey will be followed by Uzbekistan, Algeria, and Italy with percent of 13.64, 7.00, and 6.84, respectively. Since CR$_4$ is 47.02 percent oligopoly market will be dominant for apricot in the 2018-2025 period and the most important actor of this market will go along still being Turkey. The study conducted in MAF (2019) is important in terms of the significance of the expected results of this study. In terms of the apricot production area was emphasized that Turkey was the first ranking with percent of 23, Algeria, Uzbekistan, Afghanistan, and Pakistan followed to Turkey with percent of 8, 8, 6, 5, respectively. Also, the study disclosed that Turkey has 23 percent of the production quantity of apricots in worldwide, and Uzbekistan, Italy, Algeria and Iran followed to Turkey percent of 13, 6, 6, 6, respectively.

Apricot production forecast of the world and leading countries in 2018-2025
Estimates based on 1961-2017 data (including the USSR)
Estimates of apricot production in the period of 2018-2025 are shown in Fig. 1.
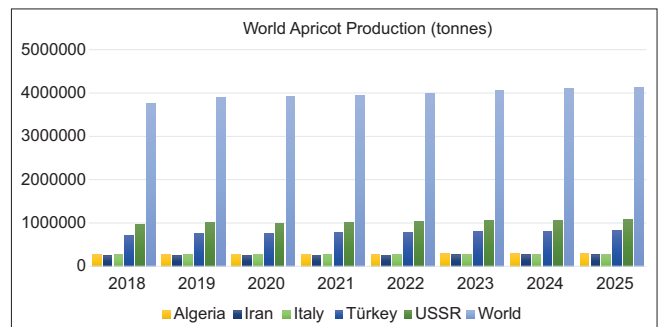

Fig 1. Forecasts of apricot production in periods of 2018-2025 in five leading countries and worldwide.

When the world apricot production estimates ARIMA (0,1,1) is analyzed, it is expected that in 2018-2025 world apricot production is 3.76, 3.90, 3.91, 3.95, 4.00, 4.06, 4.10 and 4.14 million tons, respectively. If the USSR countries were not dispersed, they would have ranked first in world production in the next 8 years. The model used in the calculation of this situation is ARIMA (4,1,1), and during this period they will produce approximately 1 million tons of apricot annually. The first country is Turkey in apricot production unless assumptions taking into account. Uzbekistan is the country with the highest apricot production in the USSR which consists of 14 countries other than Russia. Zaurov et al. (2013), said that since the dissolution of the Soviet Union, Uzbekistan is stating be the world's third-largest apricot producer behind Turkey and Iran. Also, they stated that apricot cultivars of Uzbekistan have a more general resistance to heat and cold compared with the other eco-geographical groups in Central Asia.

ARIMA (0,1,1) model was used at the estimates for Turkey. Turkey's annual average apricot production is expected to be between 700-820 thousand tons from 2018 to 2025. Topuz et al. (2018), have predicted to be between 650-750 thousand tons of Turkey's apricot production estimates for the periods of 2017 to 2022 by analyzing the data of 1961-2016 using the ARIMA (2,1,1) model with the help of the

Minitab program. According to the research results, actual and estimated production quantity was 985,000 tons and 651,000 tons in 2017, respectively. However, they estimated the 750 thousand tons in 2018 which this quantity is very close to the actual amount. If compared with our study, their prediction was less than ours in 2018 and slightly higher in other years.

Algeria, which has approximately one-third of Turkey's apricot production, is the country the most closely following Turkey. ARIMA (1,1,0) model was used in apricot production estimates for Algeria. According to FAOSTAT (2020) and Metidji (2016), the apricot production area has increased approximately 3 times and conversely, production quantity increased 2 times in the last 20 years. Also, Metidji (2016), said that apple, pear, and apricot are grown in the most productive regions of the country, where dried apricot varieties are made more production than apples and pear. Benmeziane-Derradji et al. (2019) stated that the widespread production of dried apricots in Algeria is reflected in traditional dishes, that is, it is preferred among the dried fruits that participate in the dishes.

The two countries that produce close to Algeria are Italy and, Iran, and used ARIMA (0,1,4) for Italy and ARIMA (2,1,0) for Iran in the apricot production estimates. Pergola et al. (2017), stated that in Italy, which is the biggest apricot producer in Europe, the increase in demand for this product in the last 5 years and the crisis in peach production have increased apricot production significantly. Also, they said that there was an increase in apricot production in the same periods both leader countries and worldwide. Regarding Iran, Esfandiarpour-Boroujeni et al. (2019), said that the world apricot production area is approximately 200 000 ha, and Turkey constitutes about 33% of them and almost half of Iran's apricot production is performed in the Abarkuh town of Yazd province. Although İran, one of the leading countries in fresh apricot production, have difficulties such as arduousness of accessing water resources and the increase in production costs are seen as the biggest problems preventing the increase in yield, it always finds the place to oneself between five countries in fresh apricot production.

According to the average of 2018-2025 periods, the percentage share of apricot production estimates in 5 leading and other countries is given in Fig. 2.

As shown in the figure, the share of 5 leading countries in apricot production will be 66% and the remaining countries will be 34%. The USSR is the country with the highest production in international collaboration (26%) followed by Turkey (20%), by Italy (7%), by Algeria (7%), and by Iran (6%).

Estimates based on 1992-2017 data (including Uzbekistan)

According to the average of 2018-2025 periods, the percentage share of apricot production estimates in the world and 5 leading countries is given in Fig. 3.

When the world apricot production estimates ARIMA (0,1,1) is examined, it is expected that world apricot production in 2018-2025 will be 4.03, 4.01, 4.20, 4.16, 4.22, 4.28, 4.29, and 4.43 million tons, respectively. ARIMA model is (4,1,1) in Turkey and according to this model during the years 2018-2025 apricot production is expected to be between 740-860 thousand tons. Turkey is the most closely followed by Uzbekistan, and ARIMA (2,1,0) models have been used in this country's production estimate. Annual production of 535-630 thousand tons is expected for this country. ARIMA (5,1,0) model was used in apricot production estimates for Algeria, which was the third country with 260-337 thousand tons yearly production in worldwide. This production quantity is approximately one-third of Turkey's and half of Uzbekistan's production. The two countries that produce close to Algeria are Italy and Iran and ARIMA (4.1.0) and ARIMA (2.1.0) were used in apricot production estimates. As a result, the values
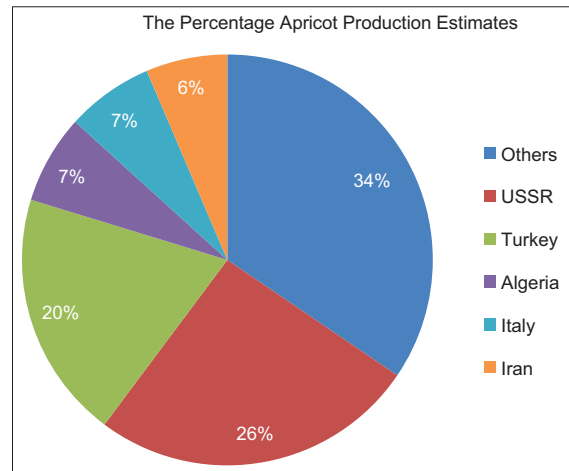

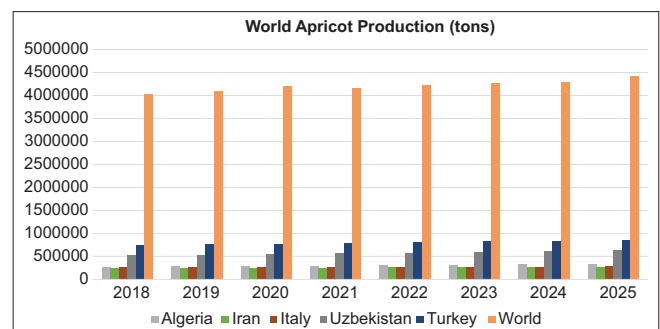**Fig 2.** The share of five leading and other countries in the apricot production.

Fig 3. Forecasts of apricot production in periods of 2018-2025 in five leading countries and worldwide.

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calculated with 1992-2017 data were slightly higher than those of 1961-2017.

According to the average of 2018-2025 periods, the percentages of apricot production estimates in five leading countries and other countries in the production are given in Fig. 4.

As seen in the figure, the share of 5 leading countries in apricot production is 52% and the remaining countries are 48%. In terms of production quantity, the leading country is Turkey with 19%. Turkey is followed by Uzbekistan, Algeria, Italy, and Iran and their percentage share are 14, 7, 6, and 6, respectively.

Leading countries in fresh apricot exports
The export amounts and sales prices of leading countries in world fresh apricot exports were compared in Table 2.
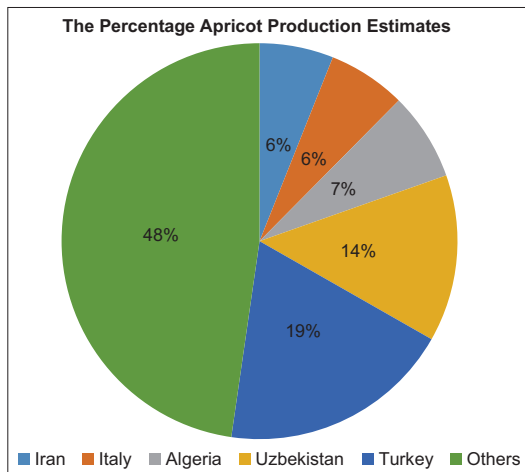

Fig 4. Estimated apricot production shares of leading countries including Uzbekistan.

Table 2: Leading countries fresh apricot exports in the world

Countries	Export quantities (1000 tons)			Price ($/kg)
	2017	2018	Average of 2014-2018 period	Average of 2014-2018 period
World	412.44	462.07	367.34	1.28
Spain	89.01	108.96	82.92	1.61
Turkey	63.54	70.73	50.69	0.73
France	56.41	28.28	49.09	1.81
Italy	44.61	26.50	29.15	1.60
Greece	24.68	23.93	18.35	0.99
Suriname	0.00	89.33	17.87	0.40
Uzbekistan	22.80	42.66	13.09	1.01
Armenia	3.91	7.22	6.50	0.58
USA	7.87	4.66	6.48	2.09
Jordan	8.37	5.82	6.09	2.32
Iranian	11.81	7.70	5.47	0.79

Source: ITC, 2019

According to the average of 2014-2018 annually average fresh apricots, export quantity is 367,340 tones and Spain is the first with a share of 22.57%. This country is followed by certain rates such as 13.80% of Turkey, France with 13.36%, Italy with 7.94%, Greece with 5.00%, Uzbekistan with 3.56%, and the USA with 1.66%, respectively.

According to the data of ITC (2019), about 90 percent of Turkey's fresh apricot market has been constituted by Russia, Iraq, Germany, Saudi Arabia, and Syrian, and their percent are 36.96, 36.87, 5.66, 5.51, and 2.46, respectively. Also, Turkey has made exports to sixty countries in the same periods. As an apricot is very perishable products often are marketed to countries close to Turkey. In the same period, the average table apricot price in the world is $1.28.

Jordan sells fresh apricots at the highest price ($ 2.32) in the world. This country is followed by the USA ($2.09), France ($1.81), Spain ($1.61), Italy ($1.60), Uzbekistan ($1.01), and Turkey ($0.73), respectively. Turkey is implementing a price of almost half of the world average. Karaat and Serce (2019) said that Turkey has not yet reached the desired level of fresh apricot export quantity and price. Because of the high price application of the countries that make the first production as the production period and the presence of the EU markets, Spain, France, Italy, and Greece are standing out in the export of fresh apricots. Aydogdu (2016) determined that considering the years 2007-2014, Jordan has achieved the biggest increase in fresh apricot exports with 44% and 53% of world fresh apricot imports were made by 6 countries in 2014. Also, countries and their production percent are ranked as Germany (23%), Russia (9%), Italy (8%), France (7%), and Kazakhstan (6%), respectively. He has determined that the main supplier of fresh apricots of Germany was France and Kazakhstan, and the supplier of Russia was Uzbekistan.

Also, ITC (2019) shows that the most important countries in Jordan's exports are Saudi Arabia and Kuwait. Considering these results, it turns out that fresh apricots should be sold in nearby markets as it is a perishable product.

Leading countries in dried apricot exports
The export amounts and sales prices of leading countries in world dried apricot exports were compared in Table 3.

According to the average of the years 2014-2018 in the world, annually 145,800 tons it is being exported dried apricots and Turkey takes first place in 56.45 percentile share. As shown in the figures Turkey is number one by a wide margin in the dried apricots export.

Gunes (2010) has said that Turkey, which has got 80 percent of world apricot production in some years, is number one

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Table 3: Leading countries dried apricot export in the world

Countries	Export Quantities (1000 tons)			Price ($/kg)
	2017	2018	Average of 2014-2018 period	Average of 2014-2018 period
World	148.98	138.74	145.48	2.67
Turkey	95.00	93.80	82.13	3.65
Tajikistan	15.59	10.90	20.76	0.26
Uzbekistan	10.89	7.45	3.67	0.98
Kazakhstan	0.81	0.65	3.04	0.24
Spain	2.14	5.05	2.84	1.71
Belarus	2.64	3.67	1.83	0.81
Kirghizstan	3.28	4.12	1.76	0.92
Germany	1.41	1.07	1.57	6.39
Netherlands	1.25	1.56	1.46	4.38
USA	1.58	1.07	1.40	5.60
France	1.35	1.35	1.31	6.87

Source: ITC, 2019

accounted for in apricot production quantity. Moreover, variables of Turkey's exports of dried apricots examine 36-month periods in 2003-2008 years and determine that disappear in the long term. During this period examined Turkey's annual earnings, Turkey obtains $180-300 million and he has determined that this change in income due to occurred changes in the exchange rate of 20 percentiles. Olgun et al (2003) said that the dried apricots mainly producing countries were Turkey, Iran, the USA, Australia, and South Africa in the 2000s. Also, they expressed that countries were unable to compete with Turkey because of the color, taste, quality characteristics such as appearance.

Turkey's closest rival, Tajikistan, which has a share of 14.27 percent. Apart from these two countries, the countries that are important in exports are Uzbekistan with 2.52%, Kazakhstan with 2.09%, and Spain with 1.95%. It could be seen Turkey's strongest competitors are the former USSR countries. In the report made in Euromonitor (2017), it was stated that dried apricots in Central Asia are provided by especially from Tajikistan and Uzbekistan and that the export amount of dried apricots in Tajikistan constitutes 77% of export value of all processed fruits and vegetables. Also, in the Middle East market, it is stated that the local apricots of this region have higher nutritional qualities than the competitive prices of other countries and that this market is a monopoly product in the eyes of the consumer. Nabievich et al (2016) emphasized that Uzbekistan is a successful exporter of fruits and vegetables, exporting more than 180 fresh and processed fruits and vegetables to 80 countries. Also, they said that this country is the leading producer and preliminary supplier of apricots, plums, grapes, nuts, and some other fruits and vegetables. Besides, UNDP (2015) stated that only a few of 23 apricot varieties are dried in Kyrgyzstan, which are among the

USSR countries, and that dried apricots originating in Kyrgyzstan can be sold at a much higher price. Therefore, it was emphasized that it would be beneficial for the country's interests to promote the direct marketing of dried apricots to northern countries instead of cross-border trade with Tajikistan or Uzbekistan from Batken, the apricot center of Kyrgyzstan.

Apart from these explanations, considering that 1 kg of dried apricot is obtained from 5 kg of fresh apricot, approximately 30% of the apricot produced in the world is subject to foreign trade, and 2/3 of this trade is carried out as dried apricot. 70% of apricots produced in Turkey, 66% in Spain, 60% in Uzbekistan, 35% in France, 10% in Greece and Italy are sold in foreign markets. In the same period, the average price of dried apricots in the world is $ 2.67. The country that sells dried apricots with the highest price ($ 6.87) in the world is France. This country is followed by Germany ($6.39), the USA ($5.60), Netherlands ($4.38), and Turkey ($3.65). The former the USSR countries apply prices between $ 0.24-0.92. The sale price of Turkey is above the average price of the world and former USSR countries. The ITC's (2019) data is striking that, Turkey makes dried apricot export to108 countries. The USA has got 13.74%, France, 8.30%, Germany, 7.04% Great Britain 6.89%, Russia, %6.73, Netherlands, %3.06, Spain, 2.60%, Algeria, 1.94% and Italy, 1.74% of this export. Some countries, applying high export prices, make substantially dried apricot import from Turkey. This situation brings to mind derivative demand. Demirel et al., (2017), determined that Turkey was ranked first in the world in the production and the export of dried apricots and it has 75% of exports of world dried apricots. Also, they said that other exporting countries are Afghanistan, Germany, Uzbekistan, and France respectively and that these countries market dried apricots mostly to the USA and European countries. In addition, in their studies using the GARCH model they determined that in about ten percent increase in the world price, Turkey's dried apricots exports increases about 3.82 and 5.00 percent in the short and long term. According to Karahan (2011), Turkey made 90-110 thousand tons of dried apricot exports in 2004-2010 periods and many productions in 2005, this much production caused the decline $1 in export prices compared to the previous period. Besides, Ucar and Engindeniz (2018) have suggested that in their study in Malatya province, apricot production can be increased by correct soil cultivation, fertilization, and other processes, and for a kilogram of dried and fresh apricot can 0.76 and 0.44 net profit. They stated that in terms of micro, the increase in production will increase the producer's income, and in terms of macro, apricot products were converted into products with high added value and thus these products can easily be sold. So that as a result apricot will make a

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significant contribution to the economy of the country by increasing the export revenues.

CONCLUSIONS AND RECOMMENDATIONS

Turkey is the third country in apricot production after the USA and Spain in the 1960s, while second from behind Spain in the 1970s, and later years has retained its first place in the queue. While apricot production made in 42-44 countries in the 1960s, this number increased to 69 countries in the 2010s. According to the estimations made taking into account in two different periods as the production period, based on the data of 1961-2017, while 2018-2025 world production estimates were expected between 3.76-4.14 million tons, the share of the total of leading five countries predicted to be 66 percent. Considering the 1992-2017 data, the world production estimate is between 4.01-4.43 million tons and the share of the first 5 countries is 52%. When the 26-year data are taken as the basis, the first country is Turkey by 19% in production according to the average estimate in the last 8 years. Turkey is followed by Uzbekistan with 14% Algeria with 7%, Iran, and Italy with 6%, respectively. Thus, while the market had the characteristics of perfect competition and monopolistic competition in the 1960s, monopolistic competition and oligopoly market started to show its characteristics after 2010s. Comparing these two terms estimates, while the world and Turkey estimates are higher 26 years than data of 57 years, on the contrary, in the data of 57 years, estimates values of Italy and Iran are higher. When viewed in foreign trade, Turkey became first at dried apricots and second-ranking in fresh apricots trade. However, the prices that have applied by Turkey, while under the world price in fresh apricot, despite being in the above the world price in the dried apricot, price is higher in some countries Turkey's trade made and not the leader in production such as Germany, France, and Netherland. If Turkey makes dried apricot trade to more countries and standardizes the products that higher prices do not allow the market to regulate the resale, it may have more influence on the world market in this product.

Authors' contributions

All authors were contributed to the writing of the article. Author #2 and Author #3 have contributed to the compilation and preparation of the data, while Author #1 translated the article in English and Author #2 did the language spelling check. Author #1 submitted the article by writing all correspondence and revisions.

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