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WALNUT (*JUGLANS REGIA* L.) TRADE: COMPETITION POWER OF TURKEY WITH BALKAN COUNTRIES

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Abstract

Turkey is one of the most important walnut producers in the world. Turkey is 4th in the world's walnut production in 2018. In this study, Turkey and the Balkan countries' which have a significant share in the world production of walnut, production, foreign trade, and competitiveness have been studied. The data set for the years 2005-2018 was used in the research. The data of this study was provided from International Trade Centre (ITC) database. Revealed Comparative Advantage Index (RCA) and Trade Balance Index (TBI) indices were used in this study. Although the walnut production of Turkey was more than the total production of Balkan countries, it was determined that Turkey has not foreign trade competitive advantage. It shows that the most competitive country is Moldavia according to the RCA and TBI scores. These findings demonstrated that Turkey is importer country in with walnut trade. In a conclusion, it can be clearly said that Balkan countries except for Bulgaria, Hungary, Moldova, and Romania are net importers of shelled walnuts in foreign trade.

***Key words*:** *walnut export, Revealed Comparative Advantage Index, Trade Balance Index, Balkan countries, Turkey*

INTRODUCTION

Walnut (*Juglans regia* L.) is one of the hard-shelled and temperate-climate fruit species within the Juglandaceae family. There are approximately 60 different species in the world and 21 of them are in the *Juglans* genus [2]. Walnut (*J. regia*) is native to central Asia. In addition, it grows as a wild, semi-cultivated, or cultivated tree in a wide area including from southeastern Europe and the Caucasus to Turkey and Iran, through southern portions of the former Soviet Union into China and the eastern Himalayas [11]. Walnut has been evaluated for both human health and nutrition purposes since B.C. 1000 [19]. Walnut (*J. regia* L.) has been used since ancient times to treat various ailments such as diarrhea, hyperglycemia, cancer, infectious diseases, anorexia, eczema, asthma, antihypertensive, neuroprotective, helminthiasis, arthritis, sinusitis, stomach pain and skin disorders [15]. Besides, walnut is rich in protein, fat and minerals and concentrated energy source [2]. Additionally, walnut is also a good source of a wide variety of flavonoids, phenolic acids, and related polyphenols [7], and contain a significant amount of B group vitamins and are the richest in vitamin B-6 among all other nuts [2].

Turkey is one of the major walnut producing countries both in Balkan countries and in the world. Indeed, China, the US, Iran, Turkey, Mexico, Ukraine, and Chile are major walnut producing countries in the world. While the People's Republic of China makes about 44% of the world walnut production, these seven countries realize 87% of the total production. When comparing the Balkan countries with each other, Romania, Greece, and Serbia are the most important walnut producer countries with a total of 97,685 tons of annual production. Thus, there is a serious competition between the Balkan countries and Turkey in walnut production and trade. In Turkey, 126 thousand tons/year walnut production in the early 2000s has reached 225 thousand tons, an increase of nearly 79% according to data from 2019, and meets 5.9% of world production of walnut. Although commercial production areas of walnut are Hakkari, Kahramanmaraş, Mersin, Bursa, Denizli, Sakarya, Bursa, Manisa, Izmir and

Balıkesir, wild walnut trees and modern walnut orchards have been across throughout Turkey. Although there are a total of 21 million pieces of walnut trees in Turkey, 50% of these walnut trees are productive age. Walnut production is made in approximately 1,246 ha areas in Turkey and the average yield per tree is 20 kg [14; 35].

However, due to the widespread use of walnut in desserts, bread, etc. in Turkey, the walnut production of Turkey does not even meet the domestic demand. Domestic demand is mostly met by importing from neighboring countries, especially the Balkan countries. Therefore, walnut production sector of Turkey in order to be competitive and efficient, it is necessary to determine the current status of the modernization situation, competitiveness, and increasing the export potential between Turkey and its neighbors such as Balkan countries. Nevertheless, there is limited data on the competitiveness of Turkey's walnut production sector both in the global market and Balkan countries. Specifically, there are no studies of the competitiveness of international walnut trade that was found between Turkey and important walnut producing countries of the Balkans such as Romania, Greece, and Serbia in the literature.

Therefore, the present investigation was undertaken to determine not only the competitiveness power of the walnut sector with Turkey and Balkan countries but also identify the problems in foreign trade.

MATERIALS AND METHODS

The main dataset (2005-2018) obtained from the International Trade Center (INTRACEN) database were used in this work. Since the most complete and consistent dataset was obtained from 2005 to the end of 2018 and due to missing data in 2019, the data set between 2005 and 2018 was used. In addition to the dataset, references from Turkey and international sources, and related reports were additionally used. There are various techniques to determine strong and weak sectors of countries. In the determination of competitiveness, the Revealed Comparative Advantages (RCA) index, first introduced by Balassa [30; 9, 23, 1], was used. Revealed Comparative Advantages Index is an index used to measure specialization in international trade and is widely accepted in the literature [3; 13; 20; 28; 34]. RCA index is used in studies to determine the strong and weak exporting sectors of a country [4; 10; 33]. The main purpose of using this index is to determine whether the country has a comparative advantage, rather than determining the sources underlying comparative advantage [12]. Balassa's RCA index is formulated as follows: $RCA_{ij} = \left[\left(\frac{X_{ij}}{X_i}\right) / \left(\frac{X_{wj}}{X_w}\right)\right]$ ..... (1)

In Balassa's formula, it is defined RCAij, as the Revealed Comparative Advantage Index of sector 'j' of 'i' country, Xij as export, Xi as total export, Xwj as total World export of sector 'j' and Xw as total World export. Since the RCA index is a value varying between 0 and ∞, the index score is being greater than or equal to 1 means that the subjected country has a comparative advantage over the sector evaluated. This situation shows that the share of the mentioned sector in total exports is higher than the share of that sector in World trade. As a matter of fact, as reported in some studies, if the index score of a sector is less than 1, that sector has no comparative advantage [25; 26]. Balassa's RCA coefficient classification that detailed below is utilized in the evaluation or comparison of these and similar situations [17]:

*Class 1: $0 < RCA \leq 1$: No comparative advantage

*Class 2: $1 < RCA \leq 2$: Weak comparative advantage

*Class 3: $2 < RCA \leq 4$: Medium comparative advantage

*Class 4: $4 < RCA$: Strong comparative advantage

There are different studies in which the competitiveness of different sectors is determined using the RCA index. There are different studies in which the competitiveness of different countries is determined by using the RCA index of different sectors such as textile, ready-made clothing, furniture, walnut, wine, honey, and grain industry [5, 6, 9, 16, 21, 24, 27, 29, 31, 32, 37]. Another

index used in determining competitiveness levels in this study research is the Trade Balance Index (TBI). This index is used in studies to determine the strong and weak exporting sectors of a country [22; 38]. This index is formulated as follows:

$$TBI_{ij} = \frac{X_{ij}-M_{ij}}{X_{ij}+M_{ij}} \quad \text{.....(2)}$$

The TBIij used in the formula is used as the trade balance indicator of j goods in-country 'i', while Xij and Mij indicate the export and import of product "j" of the country "i", respectively. Since the value of this index varies between -1 and +1, if TBIij> 0, it can be clearly said that the country under consideration is a net exporter. On the contrary, if TBIij < 0, the country considered is the net importer [36; 6; 33].

RESULTS AND DISCUSSIONS

While walnut production in Turkey was 150 thousand tons in 2005, it raised to 215 thousand tons in 2018 by 43% increase (Table 1). When the research period is examined, it is noteworthy that there was no significant change in yield between 2005-2018. It was determined that the average yield in the period examined was 0.22 ton/da. Moreover, as shown in Table1, we could conclude that Turkey was an important in shell walnut importer. At the same time, the increase in import spending of Turkey can be shown as evidence for this situation. Indeed, Turkey's import expenditures variability in 2018 compared to 2005 increased by 3,241%.

Table 1. Walnut production, walnut yield and trade statistics in Turkey

Years	Walnut production (1,000 ton)	Walnut Yield (ton/da)	Walnut shelled export value ($)	Walnut shelled import value ($)	Shelled Trade balance ($)	Walnut with shell export value (1,000$)	Walnut with shell import value ($)	With shell Trade balance (1,000$)
2005	150	0.20	1,205	24,401	-23,196	20	3,192	-3,172
2006	130	0.17	1,401	30,999	-29,598	12	9,051	-9,039
2007	173	0.21	4,316	43,325	-39,009	0	15,405	-15,405
2008	171	0.20	13,294	46,749	-33,455	6	28,245	-28,239
2009	177	0.20	10,460	45,322	-34,862	42	42,225	-42,183
2010	178	0.20	23,496	19,081	4,415	24	50,519	-50,495
2011	183	0.20	36,404	7,064	29,340	134	79,881	-79,747
2012	203	0.20	59,757	42,226	17,531	343	99,730	-99,387
2013	212	0.33	46,753	15,439	31,314	38	90,635	-90,597
2014	181	0.26	64,104	10,097	54,007	24	102,777	-102,753
2015	190	0.26	58,491	15,198	43,293	13	115,439	-115,426
2016	195	0.22	21,346	33,423	-12,077	31	139,396	-139,365
2017	210	0.23	32,513	40,254	-7,741	84	115,958	-115,874
2018	215	0.19	26,197	23,027	3,170	42	106,009	-105,967
Variability (%)	43	-3	2,074	-6	-114	110	3,221	3,241

Source: [14; 35; 18].

Producer prices of walnut in Turkey and Balkan countries between 2005-2018 years are given in Figure 1. In the 14-year period of the review, the upward trend, albeit a little, with the fluctuation in walnut producer prices is remarkable. Bulgaria has the least walnut price, while Turkey and Greece have highest prices among Balkan countries in 2018.

Revealed Comparative Advantage (RCA) index scores of Turkey and Balkan countries are given on Table 2 and Table 3. According to the RCA result with shell, Turkey can be thought to have non-comparative advantage at with shell walnut trade.

Balkan countries, while Bulgaria and Moldavia had a competitive advantage of with walnut trade. But other Balkan countries were non-competitive ones. The results of RCA revealed that while Moldavia (16.46) had high competitive power of with shell walnut trade, Albania (0.00), Bosnia (0.19), Croatia (0.03), Greece (0.15), Hungary (0.92), Macedonia

(0.01), Romania (0.51), Serbia (0.02) and Slovenia (0.02) hadn't competitive advantage. When the RCA index score between the years 2005-2018 was taken into consideration, it is clearly seen that Turkey is less competitive than the Balkan countries. However, Turkey has a more competitive position than Albania in the walnut sector between 2005 and 2018 (Table 2).

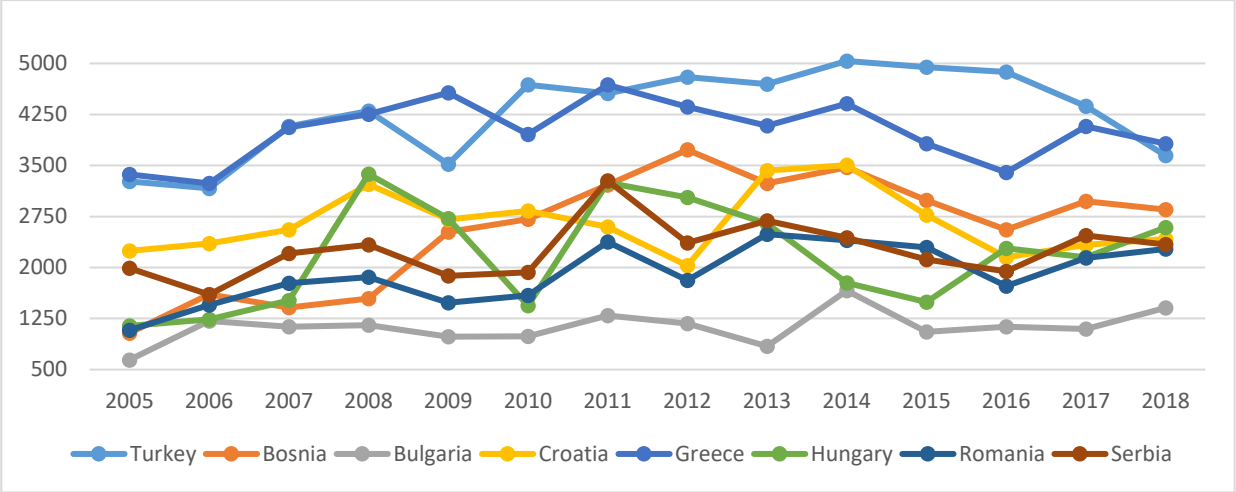

Fig. 1. Producer price walnut in Turkey and Balkan countries
Source: [14].

Table 2. Revealed comparative advantage index score for Turkey and Balkan Countries (with shell) *

Years	Turkey	Albania	Bosnia	Bulgaria	Croatia	Greece	Hungary	Macedonia	Moldavia	Romania	Serbia	Slovenia
2005	0.01	0.00	0.00	4.25	0.00	0.19	0.67	0.02	14.10	0.69		0.00
2006	0.01	0.00	0.00	6.19	0.00	0.10	1.03	0.00	8.57	0.63	0.00	0.00
2007	0.00	0.00	0.00	6.18	0.01	0.30	1.01	0.04	36.28	0.76	0.12	0.00
2008	0.00	0.00	1.44	2.30	0.00	0.41	1.51	-	26.92	0.54	0.01	0.00
2009	0.01	0.00	1.12	1.14	0.00	0.07	0.81	0.00	20.03	0.38	0.04	0.00
2010	0.00	0.00	0.00	0.87	0.00	0.12	0.66	0.00	7.64	0.34	0.01	0.00
2011	0.02	0.00	0.00	1.37	0.00	0.10	0.83	0.00	18.43	0.53	0.00	0.00
2012	0.05	0.00	0.00	0.78	0.00	0.06	0.91	0.01	19.79	0.22	0.01	0.00
2013	0.00	0.00	0.01	4.01	0.00	0.07	1.22	0.00	12.48	0.68	0.04	0.00
2014	0.00	0.00	0.00	2.53	0.37	0.03	1.45	0.00	16.43	1.11	0.01	0.28
2015	0.00	0.00	0.08	4.86	0.01	0.04	1.19	0.01	13.47	1.23	0.00	0.04
2016	0.00	0.00	0.00	0.95	0.00	0.07	0.59	0.00	13.22	0.34	0.00	0.02
2017	0.01	0.00	0.00	2.23	0.11	0.12	0.92	0.06	12.70	0.14	0.01	0.00
2018	0.00	0.00	0.14	0.65	0.00	0.28	0.47	0.01	10.33	0.07	0.00	0.00
2019	0.00		0.00	0.57	0.00	0.32	0.47	0.04	-	0.03	0.00	0.00
Mean	0.01	0.00	0.19	2.59	0.03	0.15	0.92	0.01	16.46	0.51	0.02	0.02

Source: *Calculated by author.

According to the RCA result walnut, Turkey (2.12) can be thought to have medium comparative advantage at with shelled walnut trade (Table 3).

Balkan countries, while Moldavia and Romania had a strong competitive advantage of shelled walnut trade. Bosnia and Bulgaria had a medium comparative advantage at with shelled walnut trade. But Albania, Croatia, Macedonia, Serbia and Slovenia were non-competitive ones. The comparative of RCA index score of shelled walnut trade of Turkey with Balkan countries during 2005-2018 period indicated that while Turkey was less competitive than that of Bosnia, Bulgaria, Moldavia and Romania. But it was more competitive than that of other Balkan countries (Table 3). As for RCA index score calculation, low share of walnut export in total export leads country to become less competitive. Turkey's walnut export competitive position in relation to the Balkan countries. Due to the absence of walnut exports in the period between the years of 2005-2018 Albania's RCA index score was found to be zero.

Another index used to determine the competition level of walnut trade between Turkey and Balkan countries was Trade Balance Index (TBI). TBI score is given separately for the with shell walnut and shelled walnut in Table 4 and Table 5.

Table 3. Revealed comparative advantage index score for Turkey and Balkan Countries (shelled)*

Years	Turkey	Albania	Bosnia	Bulgaria	Croatia	Greece	Hungary	Macedonia	Moldavia	Romania	Serbia	Slovenia
2005	0.30	0.00	0.48	8.53	0.61	6.61	1.09	0.02	510.16	20.56		0.01
2006	0.36	0.00	0.57	8.15	0.08	2.87	1.08	0.10	616.76	12.41	0.09	0.10
2007	0.93	0.00	2.75	6.31	0.11	3.07	1.03	0.14	576.30	9.18	0.21	0.00
2008	1.73	0.00	7.41	4.40	0.22	1.86	0.77	-	436.97	4.67	0.38	0.06
2009	1.50	0.00	25.06	3.77	0.17	1.40	0.72	0.11	508.10	7.64	0.52	0.05
2010	2.82	0.00	5.42	2.18	0.05	0.57	1.05	0.02	526.36	8.99	0.56	0.05
2011	3.42	0.00	0.10	2.36	0.24	0.36	1.74	0.01	393.82	6.63	0.34	0.03
2012	4.52	0.00	0.08	3.08	0.02	0.35	1.69	0.08	528.14	7.86	0.49	0.00
2013	3.54	0.00	0.07	3.89	0.02	0.29	1.53	0.14	452.58	8.51	0.66	0.11
2014	3.77	0.00	0.38	2.54	0.12	0.28	1.71	0.09	428.42	9.69	1.11	0.02
2015	3.10	0.00	0.28	1.30	0.23	0.25	1.32	0.09	382.66	6.09	0.59	0.34
2016	1.36	0.00	0.06	1.16	0.46	0.43	1.01	0.24	367.37	3.20	0.69	0.31
2017	1.62	0.00	0.21	1.58	0.73	0.55	0.82	0.07	308.95	3.65	0.35	0.39
2018	1.46	0.00	0.17	0.93	0.76	0.32	0.31	0.03	287.94	3.04	0.06	0.49
2019	1.31	-	0.33	0.75	0.65	0.35	0.15	0.01	-	2.84	0.14	0.51
Mean	2.12	0.00	2.89	3.40	0.30	1.31	1.07	0.08	451.75	7.66	0.44	0.17

Source: *Calculated by author.

TBI index of Turkey has been -1for all years of examined period (2005-2018 years). It can be said that Turkey is net importer country in with shelled walnut foreign trade during the period examined. With shelled walnut TBI index of Bulgaria and Hungary have been positive score examined period. It can be said that Bulgaria, and Hungary are net exporter countries during the period (2005-2018) examined. While Albania, Croatia, Greece, Makedonia, Moldovia and Slovenia had negative values of with shelled walnut TBI scores.

The TBI scores of Romania and Serbia showed constant variation in the period studied. According to these data, it is not called net importer or exporter for two countries.

Table 4. Trade balance index score for Turkey and Balkan Countries (with shell) *

Years	Turkey	Albania	Bosnia	Bulgaria	Croatia	Greece	Hungary	Macedonia	Moldavia	Romania	Serbia	Slovenia
2005	-0.99	-1.00	-1.00	0.83	-1.00	-0.85	1.00	-0.86	-0.82	0.74		-1.00
2006	-1.00	-1.00	-1.00	0.93	-1.00	-0.89	0.93	-1.00	-0.92	0.87		-1.00
2007	-1.00	-1.00	-1.00	0.80	-0.76	-0.82	0.92	-0.90	-0.67	0.89	1.00	-1.00
2008	-1.00	-1.00	0.10	0.65	-0.95	-0.81	1.00		-0.61	0.82	-0.60	-1.00
2009	-1.00	-1.00	0.31	0.91	-0.87	-0.95	1.00	-1.00	-0.52	0.95	1.00	-1.00
2010	-1.00	-1.00	-0.75	1.00	-1.00	-0.90	0.51		-0.82	0.31	0.33	-1.00
2011	-1.00	-1.00	-1.00	0.76	-1.00	-0.87	0.82	-0.98	-0.38	0.29	-1.00	-1.00
2012	-0.99	-1.00	-1.00	0.62	-1.00	-0.91	0.96	-0.93	-0.39	-0.11	-0.33	-0.99
2013	-1.00	-1.00	-0.20	0.93	-1.00	-0.82	0.98	-1.00	-0.44	0.05	0.85	-0.97
2014	-1.00	-1.00	-1.00	0.84	-0.03	-0.91	1.00	-1.00	-0.49	-0.33	-0.63	0.20
2015	-1.00	-1.00	-0.04	0.89	-0.33	-0.86	0.97	-0.83	-0.61	0.01	1.00	-0.42
2016	-1.00	-1.00	-1.00	0.69	-1.00	-0.78	0.99	-1.00	-0.57	-0.06	1.00	-0.61
2017	-1.00	-1.00	-1.00	0.82	0.40	-0.73	0.99	-0.87	-0.63	-0.85	-0.67	-1.00
2018	-1.00	-1.00	-0.22	0.69	-0.78	-0.46	0.98	-0.96	-0.75	-0.89		-0.99
2019	-1.00		0.00	0.08	-1.00	-0.45	0.99	-0.81		-0.91	1.00	-0.98
Mean	-1.00	-1.00	-0.59	0.76	-0.75	-0.80	0.94	-0.93	-0.62	0.12	0.25	-0.85

Source: *Calculated by author.

When the shelled walnut TBI score was examined (Table 5), it was determined that the scores of Bulgaria, Moldavia, and Romania were positive. According to this result, it can be said that these countries are net exporters. The TBI scores of Albania, Bosnia, Croatia, Greece, Makedonia, and Slovenia were negative in the examined period. In other words, this result shows that the mentioned countries are net importers. Hungary is

exporter during the period examined excluding the year of 2005 and 2018. Turkey is a net exporter in the examined period of 8 years, it is an importer in other years.

Table 5. Trade balance index score for Turkey and Balkan Countries (shelled)*

Years	Turkey	Albania	Bosnia	Bulgaria	Croatia	Greece	Hungary	Macedonia	Moldavia	Romania	Serbia	Slovenia
2005	-0.91	-1.00	-0.95	0.99	-0.85	-0.56	-0.15	-0.98	0.97	0.96		-0.99
2006	-0.89	-1.00	-0.88	1.00	-0.96	-0.73	0.01	-0.76	0.94	0.97	-0.35	-0.94
2007	-0.76	-1.00	-0.52	0.88	-0.95	-0.70	-0.01	-0.72	0.93	0.96	0.35	-1.00
2008	-0.56	-1.00	-0.24	0.78	-0.89	-0.73	0.54		0.94	0.99	-0.43	-0.95
2009	-0.62	-1.00	0.09	0.82	-0.94	-0.77	0.31	-0.89	0.93	0.97	-0.24	-0.97
2010	0.10	-1.00	-0.17	0.97	-0.98	-0.89	0.08	-0.94	0.97	0.91	-0.06	-0.96
2011	0.67	-1.00	-0.97	0.37	-0.91	-0.92	0.11	-0.98	0.91	0.78	-0.57	-0.98
2012	0.17	-1.00	-0.98	0.67	-0.99	-0.88	0.16	-0.87	0.98	0.86	-0.37	-1.00
2013	0.50	-1.00	-0.98	0.85	-0.99	-0.91	0.18	-0.85	0.93	0.66	-0.23	-0.93
2014	0.73	-1.00	-0.89	0.92	-0.93	-0.90	0.18	-0.90	0.92	0.63	0.32	-0.98
2015	0.59	-1.00	-0.91	0.84	-0.86	-0.91	0.15	-0.91	0.88	0.56	0.51	-0.71
2016	-0.22	-1.00	-0.98	0.64	-0.74	-0.86	0.57	-0.76	0.93	0.71	0.85	-0.72
2017	-0.11	-1.00	-0.93	0.59	-0.59	-0.82	0.31	-0.95	0.92	0.65	0.55	-0.71
2018	0.05	-1.00	-0.94	0.26	-0.49	-0.87	0.06	-0.98	0.84	0.50	-0.73	-0.67
2019	0.06		-0.91	0.06	-0.68	-0.88	-0.29	-0.99		0.40	-0.56	-0.56
Mean	-0.08	-1.00	-0.74	0.71	-0.85	-0.82	0.15	-0.89	0.93	0.77	-0.07	-0.87

Source: *Calculated by author.

CONCLUSIONS

The results of the study that Turkey is a major walnut producer country. While Turkey hasn't a comparative advantage at with walnut trade, It has a medium comparative advantage at shelled walnut trade. Turkey in shelled walnut is more competitive than the Albania, Croatia, Greece, Hungary, Makedonia, Serbia and Slovenia. Moldova and Romania from Balkan countries have strong comparative advantage at walnut trade.

Turkey is net with walnut importer country and has not comparative advantage at walnut trade. Again, Turkey is net shelled walnut importer country and has a medium comparative advantage at shelled walnut trade. Producer price of walnut high than Balkan countries due to high deficit walnut trade balance of Turkey. Walnut producer price in Greece is close to in Turkey. Other Balkan countries producer price is less than Turkey. Bulgarian producer price is lowest in the all countries.

While the competitive power of a country in foreign trade has a positive correlation with productivity and production, it has a negative correlation with domestic price. In the Balkan countries, Bulgaria, Moldova and Romania are competitive in walnut trade. Balkan countries except for Bulgaria, Hungary, Moldova and Romania are also net importers in shelled walnut.

Despite of Turkey has a great advantage in walnut production potential, high domestic demand it has to import. Turkey has been supplying the largest part of walnut imports from Balkan countries due to low transportation cost.

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