Potential of walnut (*Juglans regia* L.) nursery production and its economic importance in Turkey

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Abstract

In this study, data such as the total amount of nursery stock production in Turkey, walnut rootstock production (seedling rootstock), walnut nursery stock production per variety, number of certified nursery stock producers and distribution per province, number of producers with breeding blocks, walnut nursery stock export-imports and the amount of state funding per year have been statistically analyzed and the results provided. Data have been acquired from the Ministry of Food, Agriculture and Livestock, General Directorate of Plant Production. During the 2014-2016 period, the total certified and non-certified nursery stock production was 105,418,395 saplings. Apple plant production (30%) was followed by walnut plant production (16%) and grape plant production (11%). Looking at the distribution of walnut nursery enterprises per province, Balıkesir province was ranked first, Bursa province was ranked second, while Izmir province was ranked third. According to the General Directorate of Plant Production data, a total of 3,487,710 buds were used in walnut nursery stock production in Turkey during the 2014-2016 period. These consisted of Altınova-1, Bilecik, Şebin, Chandler, Fernette, Ferron, Franquette, Gültekin-1, Kaman 1, Kaplan-86, Maraş 18, Oğuzlar 77, Pedro, Sütyemez 1, Şen-1, Şen-2, Tokat-1, Yalova-1, Yalova-2, Yalova-3, Yalova-4 and Yavuz-1. During the 2005-2016 period, the amount of assistance provided for certified and non-certified walnut nursery stock production was TRY 100,785,483.

Keywords: walnut, walnut nursery, quantity of nursery production, export, import

INTRODUCTION

Walnut (*Juglans regia* L.) is a plant with a very wide geography that is found naturally in Eastern Europe, Turkey, Iraq, eastern Iran and the Himalaya mountains. In recent years, the increased awareness in human nutrition, increased incentives in agricultural production, advances in agricultural production techniques, and increased international trade have led to a significant increase in walnut cultivation and walnut sapling production (Ramos, 1998; Şen, 2006; Akça, 2009). It is thought that the reasons for the increase in the number of walnut trees in Turkey during the last few decades are the Certified Seedling Incentive and the training and publications provided by the Ministry of Food, Agriculture and Stockbreeding, and the activities made under the "Walnut Action Plan" realized by the Ministry of Forestry and Water Affairs.

However, in Turkey, significant economic losses have occurred in fruit cultivation and trade. The reasons for these losses can be listed as follows; increased competitive power, problems experienced in facilities that are using seedlings whose sources are not known and whose health and name are not certain. Even though the producers check the appearance, certificates and standards of the seedlings, the quality of the seedlings cannot be trusted when procuring seedlings. It is not always possible to find the desired cultivar and rootstock, seedlings do not conform to their names, and seedlings can be diseased (Karamürsel, 2010; Karamürsel et al., 2004).

In a study conducted by Lemanowicz and Krukowski (2009), Polish fruit arboriculture was reviewed. They reported that there were approximately 1150 seedling producers with a nursery production area of approximately 500 ha. They also reported that the fruit seedling

production areas were fragmented with most producers having just 0.5 ha. Nevertheless, the annual production of fruit trees was approximately 10 million saplings, with apples (50%), sour cherry (20%), plum (9%) and pear trees (7%) dominating. The annual production of peach, apricot and walnut trees was 250,000 saplings.

In a study conducted by Oğuz et al. (2016) of walnut cultivation in the Central Anatolian region, 71% reported that walnut cultivation was profitable. Most producers (57%) preferred Chandler and the Şebin cultivar (43%). Most producers (71%) preferred fall planting and naked root saplings. Planting intervals ranged from 8×6 m in Kırşehir (57%), to 8×8 m in Nevşehir (71%) and 10×10 m in Konya (57%) and in Niğde (43%).

Çiftçi and Gökçe (2005), reported that productivity was low when compared to the increased number of walnut trees in cultivation in Turkey. Most walnut orchards were not well maintained and the level of productivity was not as expected. They presented the structural traits of walnut enterprises, inputs and outputs for walnut cultivation, the problems encountered at an operational level and their proposals for solutions.

This study has been conducted with the purpose of making an assessment (in economic terms) of the walnut seedling production industry, by examining various parameters such as rootstock and cultivar production, distribution of nurserymen per province, annual production per cultivar, export and import amounts.

MATERIALS AND METHODS

For this study, data was acquired from TUIK (Turkish Statistical Institute), FAO (Food and Agriculture Organization) (2016) and BUGEM (General Directorate of Plant Production). Data were assessed in the EXCEL program to record the percent of total fruit seedling production, with and without certification between 2014 and 2016, walnut seedling (rootstock) production, walnut seedling production per cultivar, number of certified producers and distribution of seedling enterprises per province, number of producers with a breeding area, walnut seedling import-export amounts and state incentives per year.

RESULTS AND DISCUSSION

During the 2005-2016 period, the total state fruit seedling incentive for farmers in Turkey was a total of TRY 348,239,912. However, only 29% of this incentive was directed to walnut seedling producers. This is an indication that in recent years the Government of Turkey has greatly supported the establishment of new walnut plantations.

With regards to walnut seedling production in Turkey during the 2014-2016 period, 5,085,900 rootstocks and 2,785,050 buds have been used as production material. For walnut seedling production in Turkey, walnut seedlings have been used as the rootstock and cultivars such as Chandler, Maraş 18, Kaman 1, Sütyemez 1, Bilecik, Şebin, Altıova-1, Gültekin-1, Fernor, Fernette, Franquette, Gültekin-1, Kaplan-86, Oğuzlar 77, Pedro, Şen-1, Şen-2, Tokat-1, Yalova-2, Yalova-3, Yalova-4, Yavuz-1 have been used as buds.

As shown in Table 1, the TÜİK 2014-2016 statistical data indicates that 16,776,808 walnut seedlings were produced in Turkey in 3 groups, namely Blue labeled (11%), Yellow labeled (89%) and White labeled (0.1%). White labels are identified as basic breeder material in this labeling system. Saplings with white labels are of very limited availability. Yellow labels represent standard sapling production material. Saplings with yellow labels are standard production materials where nurserymen do not have any certificate of origin. Blue labels are used for certified saplings which nurserymen have kept from breeding and have protected against pests and diseases as approved by experts from the Directorate of Plant Protection Central Research Institute (Anonymous, 2018).

Table 1. Walnut seedling production in Turkey as per their labels (2014-2016, TÜİK). Source: TUIK (2016a).

Label colors	2014	2015	2016	Total
Blue labeled	408,070	653,850	781,050	1,842,970
Yellow labeled	4,216,089	4,368,524	6,333,916	14,918,529
White labeled	981	5,374	8,954	15,309

Looking at the 2014-2016 period, the most popular cultivars for Blue Certificate walnut seedling production were Chandler (1,732,620 saplings), Maraş 18 (76,850 saplings) and Kaman 1 (19,500 saplings)(Table 2).

Table 2. Most produced Blue Certificate walnut seedling (2014-2016, TÜİK). Source: TUIK (2016a).

Cultivar	2014	2015	2016	Total
Chandler	320,720	630,850	781,050	1,732,620
Kaman 1	14,000	5,500	-	19,500
Maraş 18	62,850	14,000	-	76,850
Sütyemez 1	10,500	3,500	-	14,000

White labeled seedlings are mostly being used in plant breeding.

According to Table 3, the most widely produced cultivar with a Yellow Certificate was Chandler (8,781,450 saplings), followed by Fernor (2,471,035 saplings). The most important reason for walnut producers to prefer Fernor is because it leafs out later, which is important in places 1000 m above the sea level where late frosts often occur. The third most produced Yellow Certificate cultivar is Şebin with 792,762 saplings. Şebin is a highly productive domestic cultivar that is highly regarded in places without late spring frosts for it has a high market demand.

Table 3. Most produced Yellow Certificate walnut sapling (2014-2016, TUIK). Source: TÜİK (2016a).

Cultivar	2014	2015	2016	Total
Chandler	2,302,190	2,609,644	3,869,616	8,781,450
Fernor	436,675	755,940	1,278,420	2,471,035
Şebin	432,782	221,800	138,180	792,762

According to 2018 BÜGEM (General Directorate of Plant Production) data, there are 255 registered and certified enterprises producing walnut saplings in 34 provinces in Turkey. Figure 1 indicates the provincial distribution map for certified enterprises producing walnut saplings in Turkey. According to this map, most of the walnut sapling producers are in Balıkesir (blue), Bursa and İzmir (pink), Antalya, Isparta, Samsun, Hatay and Düzce (red), followed by Mersin, Adana, Afyonkarahisar, Gaziantep, Şanlıurfa, Kahramanmaraş, Siirt, Çanakkale, Denizli, İstanbul, Manisa, Karaman, Niğde and Yalova provinces (orange). The remaining 0-1% (yellow) are located in the other provinces.

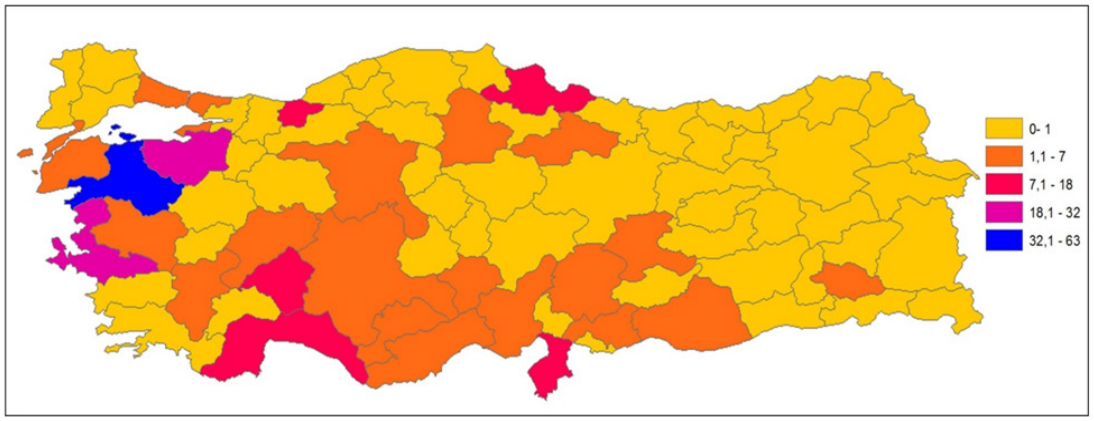

Figure 1. Distribution map of walnut sapling producers in Turkey (2014-2017, TUIK).

Table 4 indicates the value of walnut sapling imports (USD) per cultivar into Turkey.

Table 4. Walnut sapling import amount in Turkey as per cultivar ($) (2014-2017, TUIK). Source: TUIK (2017b).

Cultivars	Year					
	2011	2013	2015	2016	2017	Total ($)
Chandler	958,230	-	-	-	3,630	1,321,230
Cisco	1,235,840	-	-	-	3,626	1,598,440
Fertignac	-	-	-	-	258,984	258,984
Hartley	-	-	-	-	3,730	3,730
Howard	-	-	-	-	3,730	3,730
Lara	-	-	-	-	6,992,568	6,992,568
Paradox	280,525	-	-	-	-	280,525
Ronde de Montignac	-	-	-	-	5,332,392	5,332,392
RX1	-	-	32,255	-	-	32,255
RX1 (*Junglas regia* L.)	-	-	280	-	-	280
Scharsch Franquette	-	-	-	-	36,221	362,210
Tulare	-	-	-	30,294	-	30,294
Vlach	-	115,335	-	-	-	115,335
VX211	-		32,255	-	-	32,255
VX211 (*Junglas regia* L.)	-	-	280	-	-	280

The highest value of imports was in 2017 for the Lara cultivar (USD 6,992,568). This was followed by Ronde de Montignac (USD 5,332,392) and Tulare (USD 30,294). The reason for the increased import figures for Ronde de Montignac in recent years is because in newly established walnut orchards using Fernor cultivar, producers are preferring Ronde de Montignac, rather than Fernetteye, as the pollinator. With the demand for new cultivars increasing from walnut producers, sapling producers are feeling the necessity to import new cultivars. In Turkey, walnut cultivation generally uses walnut (*Juglans regia* L.) seedlings as the rootstock material. However, as seen in Table 4, in some newly established orchards, it is thought that Paradox rootstock is being used. As such, USD 280,525 of Paradox rootstock was imported in 2011.

During the past three years in Turkey, a total of USD 286,981 walnut saplings have been exported. The most exported saplings were of Bilecik (USD 100,082) and Şebin (USD 93,342) (Table 5).

Table 5. Export figures of domestic walnut saplings of Turkey (2014-2017, TÜİK). Source: TÜİK (2017b).

Cultivar	2013	2014	2015	2016	2017	Total ($)
Kaman 1	100	-	33,238	70	-	33,308
Juglans regia	-	-	12,000	-	-	12,000
Juglas nigra	-	460	-	-	-	460
Şebin	28,208	42,384	12,651	4,058	6,044	93,342
Yabani	-	-	14,491	-	-	14,491
Yabani Ceviz	-	-	598	28,298	4,920	33,218
Yalova	-	-	80	-	-	80
Bilecik	21,134	61,934	9,356	4,009	3,649	100,082

Domestic and foreign walnut cultivar saplings have been exported to Italy, France, Greece, Bulgaria, Georgia and Azerbaijan.

CONCLUSIONS

In recent years, the walnut nursery industry in Turkey has grown rapidly. As is the case with other agricultural sectors, the Government of Turkey is generally supportive of the

walnut sapling production sector. Farmers producing walnut seedlings in Turkey are mostly using seedlings (*Juglans regia* L.) as rootstock material. Paradox rootstock is being used in some newly established orchards, but the ratio is very low.

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