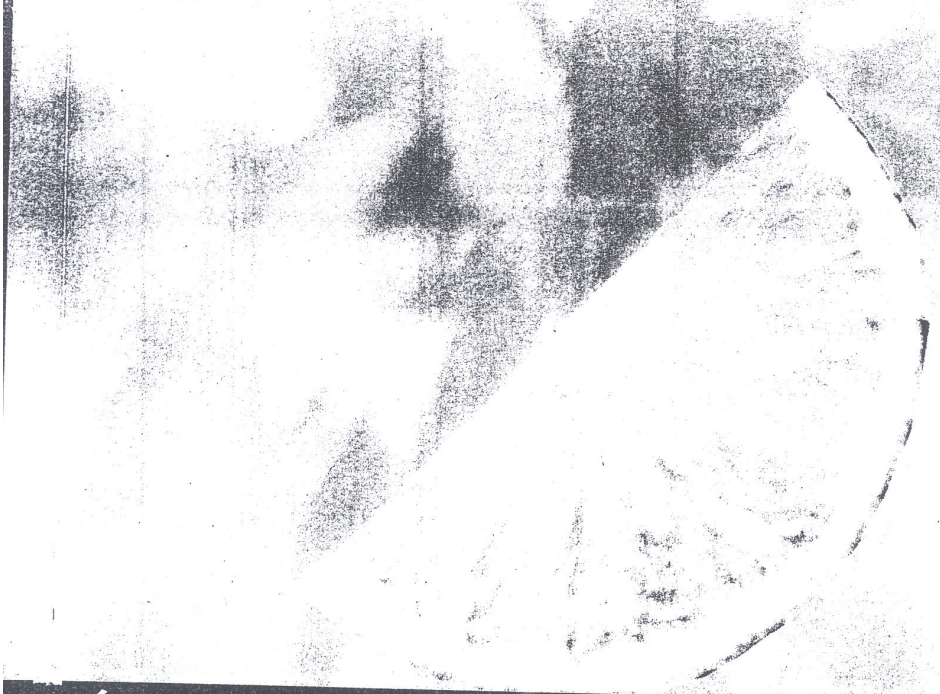
6th International Congress of Citrus Nurserymen

July 9 - 13, 2001

proceedings



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THE STUCTURE OF CITRUS PRODUCTION, THE STATUS OF ROOTSTOCKS AND NURSERY TREE PRODUCTION IN TURKEY

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Abstract: The citrus production of Turkey, a citrus importer country until 1950, reached 1,668,000 tons in 1999. This production was consisting of 830,000 tons oranges, 410,000 tons mandarins, 360,000 tons lemons and 65,000 tons grapefruits. According to 1998 statistics, the citrus export of Turkey was 332,000 tons. Navelina and Navelate oranges, Meyer and Zagara Bianca lemons, Okitsu and Clausellina Satsumas and Nules, Marisol and Arrufatina clementines have become developing cultivars. Today's situation, sour oranges, Trifoliate oranges and Troyer citranges are used intensively as a rootstock in the citrus culture and Carrizo citranges are used partially. In Turkey, detailed studies on the rootstocks were started ýn 1979. According to 1998 statistics, the total number of the nurseries, producing certified nursery trees was 71, 64 of which were private and 7 of which were official nurseries. The total number of nursery trees was 2,436,800. The 639,850 nursery trees were produced as grafted on sour orange, 1,737,150 trees on Trifoliate orange, 58,050 trees on Troyer citrange, 850 trees on Carrizo citrange and 900 trees on C35. The production of virus-free nursery trees began in the early 1990´s in Turkey. According to year 2000 records, virus-free citrus nursery trees were about 1,600,000. These figures were a quite higher than the number of nursery trees used in new plantations in Turkey.

INTRODUCTION

Turkey is located between 26º and 45º eastern meridians and between 36º and 42º northern latitudes. Most fruit species can be grown in Turkey due to various climate conditions. In Turkey, citrus are grown mostly in the Mediterranean and Aegean region and partially in the Eastern Black Sea region. Mediterranean and Aegean regions have lime-rich, alkaline soil while Black Sea region has acid soil. Mediterranean and Aegean regions have a typical Mediterranean climate, suitable to produce high quality citrus fruits (Özsan, 1979; Kaplankiran, 1999). Özcan (1991) reported that when the ecological conditions were considered, Çukurova region alone had potential to increase citrus production of Turkey by four- fold.

PRODUCTION, PRODUCTION AREA, YIELD, PRODUCTION REGIONS AND EXPORT

The citrus production was 40,197 tons in 1950, 282,160 tons in 1960, 655,700 tons in 1970, 1,158,000 tons in 1980, 1,474,000 tons in 1990, and 1,668,000 tons in 1999 (Die, 1950-1990; Fao, 1999). Total number of citrus trees was 4,892,000 in 1950 and 27,357,000 in 1997 (Die, 1950-1997). The orange production, which was 177,836 tons in 1961, reached 444,974 tons in 1970, 679,000 tons in 1980, 735,000 tons 1990, and 830,000 tons in 1999. The mandarin production increased from 34,007 tons in 1961 to 830,000 tons in 1999. The 70,440 tons of lemon production in 1961 reached to 360,000 tons in 1999. The grapefruit production increased from 2,582 tons in 1961 to 65,000 tons in 1999 (Die, 1961-1990; Fao, 1999). Between 1961 and 1999, the highest production increase rate was obtained from grapefruits (2417.12%) and mandarins (1105.63%) while the lowest production increase rate was obtained from oranges (366.72%). Between 1970 and 1997, the relative increase in the number of trees was the highest in grapefruit (943.95%) and the lowest (55.05%) in orange (Die, 1970-1997).

Between 1983 and 1998, the highest increase in production area was achieved in mandarins (Uludag et al., 1990; Fao, 1998). Grapefruits and mandarins had the highest relative increase in production areas. This situation was as a result of transferring of field crop cultivation from Çukurova region to GAP (South Eastern Anatolia Project) areas and replacement of grapefruit and mandarin instead in Çukurova region.

Generally, the yield of citrus species in Turkey

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is between 1,58- 3,19 tons/ha and follows a stabile trend. However, the yield decreased significantly in 1998 due to the low temperature, occurring in 1996-1997 winter (Uludag et al., 1990; Fao, 1998). The yield is supposed to be higher when considered the soil and climate conditions of Turkey. This situation was due to continuous establishment of new plantations and juvenile trees.

There was an increase in citrus production of the Mediterranean and Aegean region from 1970 to 1997. The citrus production of the Black Sea region decreased by 67% at the same period. Recently, mandarin production of the Mediterranean region has increased significantly. Almost all of the grapefruits were produced in the Mediterranean region (Die, 1970-1997). In present situation, 86.10%, 13.59% and 0,31% of the total production respectively is in the Mediterranean, in the Aegean and in the Black Sea regions.

The citrus export, in general, fluctuates significantly by years, mandarin and grapefruit export show stability. In 1998, the citrus export of Turkey was 332,000 tons and mandarins with 118,251 tons were firs ranked in this export. Between 1985 and 1998, the total citrus export of Turkey increased by 16.81% (Tuzcu, 1993; Uysal and Yagcioglu, 1997; Clam, 1998). It might be estimated that the citrus export might continue to fluctuate by years, but might continue to increase due to the development of the trade and relationship between other Turkish republics and Turkey.

GROWN CULTIVARS AND ROOTSTOCK USED IN TURKEY

Washington Navel, common oranges (Kozan yerli, Dörtyol yerli, Finike yerli and Alanya dilimli etc.), Valencia, Yafa, and Hamlin are the most common grown orange cultivars. The production of Navalina and Navelate cultivars, belonging to Navel group, has been developing. In addition, there is a limited pigmented orange production. Midknight Valencia cv. has been called attention recently. The most common grown mandarin cultivars are Owari Satsuma, Clementine, Fremont, Nova and Robinson mandarins. In addition, there is a limited Encore, Kara, Lee, and Osceola and Fairchild production. The production of Okitsu, and Clausellina Satsumas, Nules, Marisol and Arrufatina clementines has increased recently. Kütdiken, Interdonato and Italian memeli are the most grown lemon cultivars. Santa Terasa, Lamas, Molla Mehmet, Kýbrýs and Monachello are produced in a limited scale. The production of Zagara Bianca and Meyer cultivars has increased recently. Marsh Seedless, Redblush, Star Ruby, Henderson, Rio Red are the important grapefruit cultivars in Turkey.

Today's situation, sour oranges, Trifoliate oranges and Troyer citranges are used intensively and Carrizo citranges are used partially. Sour oranges are used in the entire Mediterranean region while Trifoliate oranges are widespread in the Aegean and Black Sea regions. The intensive use of the Trifoliate oranges as a rootstock is related to climate and soil conditions and dominant Satsuma cultivar in these regions. Troyer citrange have become widely used in the Aegean region.

Important studies on the citrus rootstocks in Turkey were started in 1979. Five-year cumulative yield (1987-1991) of the Washington Navel orange, Kütdiken lemon, Redblush grapefruit and Satsuma Owari mandarin, planted by 7x7 meters in Adana in 1982, was presented in Fig. 1.

NURSERY TREE PRODUCTION

The number of new-planted citrus nursery trees in Turkey by species and years was given in Table 1. As seen in Table 1, the number of trees planted per year was the highest between 1985 and 1990, followed by 1980-1985 period (Die, 1960-1998; Kaska et al., 1990). This figure decreased between 1995 and 1998 in all species because of stagnancy of citrus market in that period.

Table 1 - Citrus nursery trees planted per year in Turkey by species and periods.

Years	Species				
	Orange	Mandarin	Lemon	Grapefruit	Total
1960-65	401,200	129,600	47,000	1,000	578,800
1965-70	73,800	186,600	93,600	5,000	359,000
1970-75	91,200	217,400	228,200	23,600	560,400
1975-80	220,600	99,000	166,000	6,700	492,300
1980-85	204,400	336,400	66,000	13,800	620,600
1985-90	152,200	323,400	214,000	20,200	709,800
1990-95	164,400	114,200	90,200	76,000	444,800
1995-98	54,000	33,300	71,300	14,000	172,600

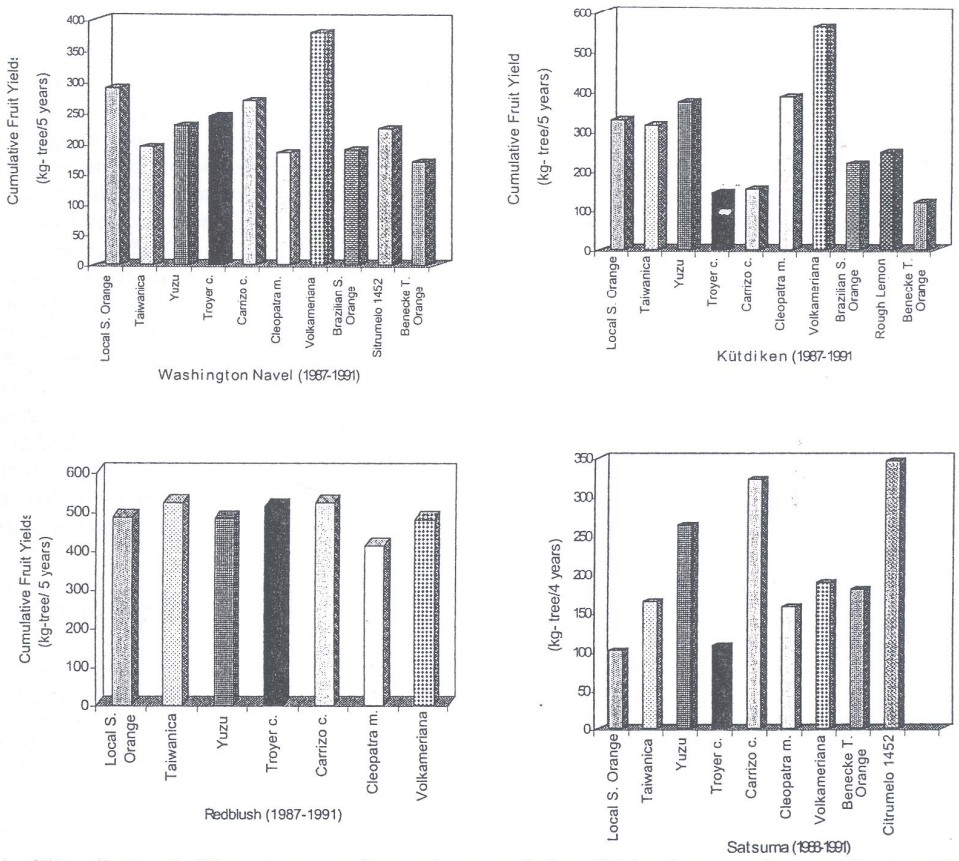

Figure 1 - The effects of different rootstocks on the cumulative yields of some citrus cultivars under Adana ecological condition.

Table 2 - The number of nurseries and the distribution of nursery trees by species and rootstock.

Type of nursery operations	Number of nurseries	Species	Rootstocks					Total
			Sour orange	Trifoliate Orange	Troyer	Carrizo	C 35	
Private nurseries	64	Orange	279,150	118,050	6,800	--	900	404,900
Official nurseries	7	Mandarin	148,300	791,250	45,200	850	--	985,600
Total	71	Lemon	208,750	822,350	4,800	--	--	1,035,900
		Grapefruit	3,650	5,500	1,250	--	--	10,400
		Total	639,850	1,737,150	58,050	850	900	2,436,800

The distribution of virus-free citrus nursery trees was started in the 1990s. At the beginning, official nurseries arranged this distribution. Today, private nurseries produce most of the nursery trees. According to year 2000 records, virus-free citrus nursery trees were about 1,600,000 (Anonymous, 2000).

According to 1998 records, the distribution of nurseries, producing certified citrus nursery trees, in Turkey by species and rootstock was presented in Table 2 (Anonymous, 1998). As seen in Table 2, the total number of these nurseries was 71, 64 of which were private and 7 of which were official nurseries. At the same year, total 2,436,800 citrus nursery trees

were produced (404,900 oranges, 985,600 mandarins 1,035,900 lemons and 10,400 grapefruits). Most of the orange nursery trees were grafted on sour orange while mandarin, lemon, and grapefruit nursery trees were grafted on Trifoliate oranges. This situation is due to the fact that the largest nurseries are located in Aegean region and Trifoliate oranges have been used widely in this region for long time. The production of lemon nursery trees (1,035,900) was the highest. After 1996, citrus fruit prices decreased, but lemon fruits were affected the least by this situation. Therefore, lemon has become preferred species for new plantation. Mandarin nursery trees production are the second highest because of effects of GAP on the citrus culture. Mandarins are the most suitable species for the Çukurova ecological conditions. The production of grapefruit nursery trees have been low recently because growers have lost interest in this species as a result of low grapefruit prices in the market.

DISCUSSION

The total citrus production was 1,668,000 tons in 1999 and the total citrus producing area was 83,690 ha. Several researchers suggested that Turkey had proper ecological conditions to increase citrus production and citrus growing areas (Ozsan, 1979; Tuzcu et al., 1995; Kaplankiran, 1999). The study in Çukurova region, very important region for citrus culture in Turkey, showed that this region had potential to increase citrus production by four- fold (Ozcan, 1991). Turkey is a citrus importer country until 1950, the citrus fruit export of Turkey was 392,890 tons in 1995 and 285,000 tons in 1998. It might be estimated that the export might continue to fluctuate by years and might continue to increase due to the development of the trade and relationship between other Turkish republics and Turkey (Kaplankiran, 1999). Tuzcu et al. (1995) estimated that there might be about 700,000 tons of citrus export in 2005. Grapefruits and mandarins had the highest relative increase in production areas. This situation was as a result of transferring of field crop cultivation from Çukurova region to GAP (South Eeastern Anatolia Project) areas and replacement of grapefruit and mandarin instead in Çukurova region. Especially, it was estimated that mandarin production in Çukurova region would increase by introducing new cultivars to the region (Kaska et al., 1991). However, the rate of establishment of new plantations has slowed down recently. Tuzcu et al. (1995) reported that grapefruit production and export of Turkey might slow down as a result of decreasing demand for grapefruits in the world.

The production of Navelina and Navelate, belonging to Navel group, has been developing. Midknight Valencia production might provide important benefits. The production of Okitsu, and Clausellina Satsumas, Nules, Marisol and Arrufatina clementines has increased recently. Especially, with Clausellina Turkey can enter the world's Satsuma market earlier. The encouragement of the seedless clementines can improve clementine production of the Turkey. It seems to be required to grow late mandarin cultivars in proper ecological conditions in Turkey in order to follow the world's citrus market.

In the citrus culture of Turkey, sour oranges, Trifoliate oranges and Troyer citranges are used intensively and Carrizo citranges are used partially (Tuzcu, 1978; Kaplankiran, 1999). Sour oranges are the dominant rootstocks in the Mediterranean region where 88% of citrus fruits are produced while Trifoliate oranges are dominant in the Aegean and Black Sea region. Detailed studies on the rootstocks were started in Turkey in 1979. According to the results of these studies, Carrizo citrange and citrumelo 1452 for Washington Navel; citrumelo 1452, Carrizo and Troyer citranges for Valencia; Carrizo citrange and citrumelo 1452 for Satsuma mandarin; Carrizo citrange for Marsh Seedless and Redblush grapefruits, Cleopatra mandarin for Kütdiken lemon and Taiwanica for Italian Memeli were suggested in the Çukurova region, an important region for citrus culture in Turkey, to obtain high yield and quality (Tuzcu et al., 1998). However, only 2.5% of the suggested rootstock was used in practice when considered the nursery tree production (Anonymous, 1998). This situation might be due to fact that growers insist on the rootstock which they are accustom to use and get good performance from sour orange or Trifoliate orange. In the nurseries, the production is not arranged according to research results.

There was a significant difference between nursery trees produced and nursery trees planted in 1998. This situation is due to effects of the stagnancy of citrus market and low prices on the new plantations. Since nursery owners did not expect this situation they could not plan their production well.

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