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SUMMARY – Turkey is one of the native lands of the pomegranate, which has spread and is grown in every area, both in the coastal and the mountainous areas, up to altitudes of 1000 m. Pomegranate is mainly grown in the Aegean, Mediterranean and Southeastern Anatolia regions. Its cultivation has been increasing in Southern Anatolia region with a GAP project in recent years. Total pomegranate production in 1996 reached approximately 56,000 tons in Turkey, and the country is one of the world's important pomegranate export countries. There are different types and forms, because Turkey extends over large native areas of the pomegranate. In this respect, many selections are found which are the result of several breeding works. Selections have been examined under the Aegean, Mediterranean and Southern Anatolia ecological conditions, and their characteristics have been determined. In the light of the research done in Turkey, we observe that there are a lot of pomegranate varieties. Among these varieties, with respect to fruit taste, there are sour, sour-sweet and sweet varieties. Also, in terms of seed toughness, there are different types, such as soft-seed, intermediate and hard-seed. Because of the rich genetic material existing in Turkey in terms of gene source, collection parcels have been established at Çukurova University. Hicaznar, Çekirdeksiz VI, Silifke Aşısı, Katırbaşı and Lefan are some of the most important varieties which are cultivated in the country. Hicaznar is especially first amongst the exported varieties. Also, different investigations have been carried out on pomegranates in Turkey, some of which are in relation to the prevention of fruit cracking, pollination and fertilization biology, propagation etc.

Key words: Pomegranate, Turkey.

RESUME – *"La culture du grenadier en Turquie". La Turquie est l'une des terres d'origine de la grenade. Cette culture s'est étendue et existe dans toutes les zones, aussi bien sur le littoral que dans les régions montagneuses, jusqu'à des altitudes de 1000 m. La grenade est cultivée principalement dans les régions de la mer Egée, de la mer Méditerranée et du SE de l'Anatolie. Cette culture a augmenté dans le SE de l'Anatolie avec un projet GAP pendant ces dernières années. La production totale de grenades en 1996 a atteint environ 56.000 tonnes en Turquie, et le pays est l'un des grands exportateurs mondiaux de grenades. Il en existe de différents types et formes, car la Turquie recouvre de grandes terres d'origine de la grenade. A cet égard, on trouve beaucoup de sélections qui sont le résultat de plusieurs travaux d'amélioration. Les sélections ont été examinées dans les conditions écologiques de la mer Egée, Méditerranée et Sud de l'Anatolie, et leurs caractéristiques ont été déterminées. A la lumière des recherches menées en Turquie, nous observons qu'il y a un grand nombre de variétés de grenades. Parmi ces variétés, en ce qui concerne le goût du fruit, il y a des variétés amères, douces-amères et douces. De même, en termes de rugosité des graines, il y en a de différents types, telles que celles à graines molles, intermédiaires et dures. En raison de la richesse du matériel génétique existant en Turquie pour ce qui est des souces de gènes, des parcelles de collection ont été établies à l'Université de Çukurova. Hicaznar, Çekirdeksiz VI, Silifke Aşısı, Katırbaşı et Lefan, sont quelques-unes des variétés les plus importantes qui sont cultivées dans le pays. Hicaznar vient en tout premier lieu parmi les variétés exportées. Différentes recherches ont également été menées sur la grenade en Turquie, dont certaines sont en rapport avec la prévention des craquelures des fruits, la biologie de la pollinisation et de la fertilisation, la propagation, etc.*

Mots-clés : *Grenade, Turquie.*

Pomegranate growing in turkey

The cultivation of the pomegranate (*Punica granatum* L.) is mainly confined to the tropics and subtropics and it grows well in arid and semi-arid climates. The best climatic conditions are found in Middle East Assian. Favourable growth takes place where winters are cool and summers are hot. It is evergreen in the tropics and deciduous in the subtropics. It has the ability to withstand frosty conditions, but below –10°C the hardiness is poor. A temperature of 38°C and a dry climate during fruit development produced best quality fruits. Areas with high relative humidity or rain are totally unsuitable for its cultivation, as fruits produced under such conditions tend to taste less sweet (Kumar, 1990; Anonymous, 1997; Özgüven, 1997).

Turkey lies between 42° 06' - 35° 51' north latitudes and 25° 40' - 44° 48' east longitudes in the

northern hemisphere of the world. On three sides it is bordered by three seas: the Mediterranean, Aegean and Black Seas. Turkey has many different climates. The climate in Turkey changes from subtropical to temperate in accordance with its regions. It has nine agricultural regions which are: Central North, Aegean, Marmara, Mediterranean, North-East, South-East, Black Sea, Central East and Central South.

The Mediterranean, Aegean and South-East regions have more suitable climates for pomegranate growing. The Mediterranean and Aegean regions have typically Mediterranean climates, i.e. rainy and warm in winter, hot and dry in summer. The climate in the South-East region is harsh, i.e. rainy or snowy and cold in winter, dry and hot in summer. Total temperature during the vegetation period is higher in the South-East region than those found in the Mediterranean and Aegean regions.

Turkey is one of the native lands of the pomegranate, which has spread, and is grown in every area, both in the coastal and the mountainous areas, up to altitudes of 1000 m. Although this fruit species is cultivated as a regular orchard, it is also grown mixed with other fruit trees or as scattered plants or as roadside hedges. In recent years, in some regions regular pomegranate orchards began to appear due to the increases in market prices.

The total pomegranate production of Turkey was 56,000 tons in 1996 (Table 1). The increase ratio between the years 1972 and 1996 was 320 percent. In Turkey, pomegranate growing areas are extended over nine different regions (Table 2). The Mediterranean region is the most important with 22,646 tons, the Aegean region takes second place with 18,430 tons, and the third one is South-East region with 6761 tons (Table 2) (Anonymous, 1996).

Table 1. The number of fruit-bearing and non-fruit-bearing pomegranate trees and their production in Turkey[†]

Years	Number of trees '000		Production (tons)	Index
	Fruit bearing	Non-fruit bearing		
1972	945	164	17,500	100.0
1973	983	216	26,000	148.6
1974	1050	204	26,500	151.4
1975	1090	216	23,700	135.4
1976	1250	300	28,000	160.0
1977	1300	300	29,000	165.7
1978	1340	325	40,000	228.6
1979	1350	340	32,000	182.9
1980	1375	320	36,000	205.7
1981	1400	340	35,000	200.0
1982	1440	350	33,500	191.4
1983	1500	360	34,000	194.3
1984	1500	380	36,000	205.7
1985	1550	365	33,000	188.6
1986	1705	540	35,000	200.0
1987	1790	528	44,000	251.4
1988	1989	509	45,000	257.1
1989	2028	500	48,000	274.3
1990	2110	456	50,000	285.7
1991	2194	504	53,000	302.9
1992	2200	485	50,000	285.7
1993	2245	484	55,000	314.3
1994	2258	476	58,000	331.4
1995	2304	495	53,000	302.9
1996	2350	520	56,000	320.0

[†]Anonymous, 1996.

Table 2. Pomegranate production in regions in Turkey†

Regions	Production (tons)
Central North	4,814
Aegean	18,430
Marmara	236
Mediterranean	22,646
North East	172
South East	6,761
Black Sea	391
Central East	898
Central South	1,652
Total	56,000

†Anonymous, 1996.

In terms of provinces, 52 of the 80 provinces of Turkey have been producing pomegranate. The biggest production in 1996 is found in İçel with 8160 tons. İçel is a coastal city in the Mediterranean region, and has a lot of regular pomegranate orchards. The second and third provinces in terms of production in 1996 are Aydın and Denizli, which have 6932 and 5296 tons respectively. Aydın and Denizli are in the Aegean region (Table 3) (Anonymous, 1996).

Table 3. Pomegranate production in provinces in Turkey†

Provinces	Production (tons)
İçel	8,160
Aydın	6,932
Denizli	5,296
Hatay	4,471
Bilecik	4,052
Gaziantep	3,667
Siirt	3,261
İzmir	2,935
Antalya	2,879
Adana	2,760
Karaman	1,539
Şanlıurfa	1,030
Balıkesir	1,000
Others	8,018
Total	56,000

†Anonymous, 1996.

The majority of production is consumed in local markets and 4.2% of the total amount (2214 tons) is exported to the European and Near East countries, especially Germany, England and Benelux in 1995. The income of this exportation was US$1,428,793. The pomegranate import of Turkey was 3110 kg in 1995 (Table 4) (Anonymous, 1995). Hicaznar pomegranate cv. is the most exported cultivar from Turkey. Also, there are some exported cultivars.

There are different types and forms, because Turkey extends over native spreading areas of the pomegranate. In this respect, many selections are found which are the result of several breeding works (Onur, 1983). Selections have been examined under the Aegean, Mediterranean and South-eastern Anatolian ecological conditions, and their characteristics have been determined (Ercan; Yılmaz *et al*., 1993; Özgüven *et al*., 1996; Özgüven *et al*., 1997).

Table 4. Pomegranate import and export in Turkey[†]

Countries	1991		1992		1993		1994		1995		Percentage (1995)	
	Amount	Value ($)	Amount (kg)	Value ($)	Amount (kg)	Value ($)	Amount (kg)	Value ($)	Amount (kg)	Value ($)	Amount	Value
						Export						
Germany	509,643	355,186	435,102	273,836	428,639	248,153	967,029	520,814	1,336,976	923,544	60.394	64.638
Austria	44,334	23,659	95,066	47,054	63,471	27,404	111,896	58,810	122,447	89,469	5.531	6.262
Bahrain	-	-	-	-	-	-	9,200	3,180	-	-	0.000	0.000
Benelux	36,120	12,637	13,050	5,075	14,784	6,879	58,856	17,863	128,787	58,676	5.818	4.107
Denmark	13,940	6,381	5,200	3,236	1,420	756	28,295	14,029	13,466	10,910	0.608	0.764
Dubai	-	-	12,900	3,990	-	-	-	-	-	-	0.000	0.000
Ivory Coast	-	-	-	-	-	-	-	-	50	16	0.002	0.001
France	3,655	2,523	5,210	2,023	900	433	137,370	86,800	6,402	3,820	0.289	0.267
Hırvadistan	-	-	-	-	-	-	-	-	5,587	3,569	0.252	0.250
Holland	17,288	8,969	29,351	14,869	31,716	36,118	98,313	47,557	182,415	130,856	8.240	9.158
England	154	94	20,000	33,979	-	-	-	-	3,984	3,901	0.180	0.273
Sweden	22,528	21,457	4,710	1,360	1,248	693	40,986	26,231	87,976	62,228	3.974	4.355
Switzerland	6,917	2,256	1,920	669	-	-	12,184	5,409	17,576	10,962	0.794	0.767
NCTR[††]	-	-	-	-	-	-	-	-	4,072	2,000	0.184	0.140
Quatar	-	-	-	-	-	-	197,280	69,892	95,680	39,822	4.322	2.787
Kuwait	9,403	2,598	27,667	9,040	16,100	6,322	41,120	14,717	29,651	9,284	1.339	0.650
Moldowa	-	-	-	-	-	-	2,580	1,008	-	-	0.000	0.000
Norway	197	282	-	-	239	249	17,309	9,834	33,360	21,070	1.507	1.475
Polond	2,170	614	1,280	1,023	-	-	-	-	-	-	0.000	0.000
Romania	-	-	-	-	17,000	2,564	111,465	39,538	2,365	430	0.107	0.030
Russia	-	-	-	-	-	-	7,611	3,695	48,250	13,158	2.180	0.921
Saudia Arabia	89,798	17,776	134,482	27,046	309,980	119,511	177,707	66,400	55,700	15,960	2.516	1.117
Ukraine	-	-	-	-	-	-	-	-	22,435	13,786	1.013	0.965
Urdün	4,459	763	-	-	-	-	-	-	-	-	0.000	0.000
Greece	-	-	-	-	-	-	-	-	16,595	15,332	0.750	1.073
Total	509,643	455,195	785,938	423,202	885,497	449,082	2,019,501	985,777	2,213,774	1,428,793	100.000	100.000
						Import						
Iran	-	-	-	-	-	-	-	-	3,110	420	100.000	100.000
Total	-	-	-	-	-	-	-	-	3,110	420	100.000	100.000

[†]Anonymous, 1995.
[††]North Cyprus Turk Republic.

In the light of the research carried out in Turkey, we observe that there are a lot of pomegranate varieties. Among these varieties, in respect of fruit taste, there are sour, sour-sweet and sweet varieties. Also, in terms of seed toughness, there are different types such as soft seed, intermediate, and hard seed. Because of the rich genetic material found in Turkey in terms of gene source, collection parcels have been established at Çukurova University. Hicaznar, Çekirdeksiz VI, Silifke Aşısı, Katırbaşı and Lefan are some of the most important varieties cultivated in Turkey.

These studies have been conducted mainly in the following centres:

(i) Mediterranean Region
- Çukurova University Agricultural Faculty Horticultural Department – ADANA.
- Antalya Greenhouse and Citrus Research Institute – ANTALYA.
- Alata Horticultural Research Institute - Erdemli – İÇEL.
- Alanya Horticultural Growing Station - Alanya – ANTALYA.

(ii) Aegean Region
- Aegean Agricultural Institute - Menemen İZMİR.
- Aegean University Agricultural Faculty Horticultural Department – İZMİR.
- Bademli - Ödemiş Agricultural Development Cooperative – İZMİR.
- Selçuk Province Seedling – İZMİR.

(iii) Southeastern Anatolia
- Koruklu Research Station in GAP Area – ŞANLIURFA.
- Ceylanpınar Agricultural Management – ŞANLIURFA.
- Pistachio Nut Research Institute -GAZİANTEP.

Some investigations have been carried out on physiology of the pomegranate in Çukurova University. One of these was related to fruit cracking and splitting, with the aim of the investigation being to prevent these problems. The results were successful. GA_3 treatment in this investigation prevented fruit cracking and splitting (Özgüven and Yılmaz, 1998).

In another examination, some pomegranate cultivars were examined in South-East Anatolian Region. In the results of this examination, 01N03 Fellahyemez II, 2/3 Japon Narı, 33N26 Çekirdeksiz VI, 26/3 Çekirdeksiz, 33N24 Beynarı, 07N08 Hicaznar and Suruç were found the most fruitful and successful cultivars for this region (Özgüven *et al*., 1997).

Combination breeding works have been started in Antalya Greenhouse and Citrus Research Institute with the cultivars selected in the Mediterranean Region. Also propagation, pollination and fertilisation biology works have been done in the same Institute. Pollination and fertilization biology works have been carried out in the Horticultural Department of Agricultural Faculty of Çukurova University. The similar studies have been done at the Horticultural Department of Agricultural Faculty of Akdeniz University (Gözlekçi, 1997).

Among the selected pomegranate varieties Hicaznar, Silifke Aşısı, Devedişi and Lefan are the best in comparison with the others.

During selection studies conducted by institutes, some genomes are selected. These are: 01 N 03 Fellahyemez (II), 01 N 04 Fellahyemez (I), 01 N 05 Devedişi (I), 01 N 06 Evci, 01 N 07 Mayhoş (VIII), 07 N 01 Çekirdeksiz (I), 07 N 03 Yufka Kabuk, 07 N 04 Mayhoş (II), 07 N 06 Devedişi (II), 07 N 08 Hicaz Nar, 07 N 10 Giliksiz, 07 N 13 Çekirdeksiz (III), 07 N 14 Mayhoş (IV), 07 N 15 Çekirdeksiz (IV), 31 N 06 Lefan, 31 N 07 Katırbaşı, 31 N 11 Adsız, 33 N 09 Mayhoş (I), 33 N 10 Çekirdeksiz (II), 33 N 11 Aşı Nar, 33 N 12 Ekşi Göknar, 33 N 16 Silifke Aşısı (II), 33 N 23 Çevlik, 33 N 24 Bey Narı (II), 33 N 26 Çekirdeksiz (VI), 33 N 27 Değirmençayı, 33 N 34 Mayhoş (VII), 33 N 42 Devedişi (V), 33 N 49 Mayhoş (VI), 33 N 51 Ekşi Kırmızı, 33 N 52 Tatlı Mayhoş (II), 33 N 53 Ernar, Ekşilik, Çekirdeksiz Alanya, 2/3 Japon Narı, 8/3 Kadı, 10/3 Kara (I) (İzmir 10), 15/3 Çekirdeksiz (III) (İzmir 15), 16/2, 16/3 Sulu Nar (İzmir 16), 23/2 Çekirdeksiz (İzmir 23), 26/3 Çekirdeksiz (İzmir 26), 29/1 Devedişi (III) (İzmir 29), 1/1 Gevrek Nar (İzmir 1), 3/1 Ekşi Nar, 4/3 Taif, 5/2 Kadı (II), 6/3 İnce Kabuklu, 7/1 Kadı (I), 11/3 Melit Nar, 12/3 Melit Nar (I), 13/3 Lefan (II), 14/3 Lefan (I), 19/1 Feyiz (III), 20/3 Feyiz (IV), 22/9 Feyiz (I), 24/1 Devedişi II, 27/3 Devedişi 1-A, 28/1 Devedişi (I), 1264 Ekşi Nar, 1483 Kayısı Narı, 1261 Kayısı Narı, 1265 Paşa Narı, 1465 Yakut Narı (Çekirdeksiz), 1479 Mis Nar, 1513 Ziraat Mayhoşu,

1267 Dere Narı, Katır Narı, Kuş Narı, Millesi, Tirbey, Suruç, Suruç Tatlı, Suruç Kara, Gök Millesi, Boncuk.

The characteristics of some selected varieties are as follows:

(i) 07 N 08 Hicaznar
The origin of this variety is Alanya (Antalya). Fruit rind colour is red-yellow. The arils are dark red. The taste is sour sweet. The seed hardness is intermediate. It grows well in the Mediterranean region. The variety is exported.

(ii) 33 N 26 Çekirdeksiz (VI)
The origin of this variety is Anamur (İçel). Fruit rind colour is red-yellow. The arils are pink or red. The taste is sweet. The seed hardness is soft.

(iii) 33 N 16 Silifke Aşısı
The origin of this variety is Silifke (İçel). Fruit rind colour is red. The arils are red. The taste is sour sweet. The seed hardness is intermediate.

(iv) 31 N 06 Lefan (or Lifani)
The origin of this variety is İskenderun (Hatay). The fruit rind colour is yellow-red. The arils are pink. The taste is sour sweet. The seed hardness is intermediate.

(v) 31 N 07 Katırbaşı
The origin of this variety is Dörtyol (Hatay). Fruit rind colour is yellow-red. The arils are red. The taste is sour sweet. The seed toughness is intermediate.

(vi) 33 N 23 Çevlik
The fruit rind colour is yellow-red. The arils are pink. The taste is sweet. The seed toughness is hard.

(vii) 07 N 14 Mayhoş (IV) or Ekşi Nar
The origin of this variety is Alanya (Antalya). The fruit rind colour is red-yellow. The arils are red. The taste is sour. The seed toughness is hard.

(viii) 33 N 12 Ekşi Göknar
The origin of this variety is Erdemli (İçel). The fruit rind colour is yellow-red. The arils are dark red. The taste is sour. The seed toughness is hard.

(ix) 07 N 03 Yufka Kabuk
Fruit rind colour is yellow. The aril is light pink. The taste is sweet. The seed toughness is hard.

(x) 33 N 11 Aşı Nar
Fruit rind colour is yellow-pink. The aril is light pink. The taste is sweet. The seed toughness is intermediate.

(xi) 01 N 04 Fellahyemez (I)
The origin of this variety is Ceyhan (Adana). Fruit rind colour is yellow-pink. The aril is pink. The taste is sweet. The seed toughness is soft.

(xii) 1/1 Gevrek Nar (İzmir 1)
The origin of this variety is Ayvalık (Balıkesir). Fruit rind colour is light pink. The aril is pink. The taste is sweet. The seed toughness is soft.

(xiii) İzmir 2
The origin of this variety is Ayvalık (Balıkesir). Fruit rind colour is light pink. The aril is pink. The taste is sweet. The seed toughness is hard.

(xiv) İzmir 8
The origin of this variety is Pınarbaşı (İzmir). Fruit rind colour is pink. The aril is red. The taste is sweet. The seed toughness is hard.

(xv) 10/3 Kara (I) (İzmir 10)
The origin of this variety is Ayvalık (Balıkesir). Fruit rind colour is pink. The aril is red. The taste is sweet. The seed toughness is hard.

(xvi) İzmir 12
The origin of this variety is Doğanlar (İzmir). Fruit rind colour is pink. The aril is pink. The taste is sweet. The seed toughness is hard.

(xvii) İzmir 1261
The origin of this variety is Fethiye (Muğla). Fruit rind colour is dark pink. The aril is light pink. The taste is sweet. The seed toughness is soft.

(xviii) İzmir 1267
The origin of this variety is Bodrum (Muğla). Fruit rind colour is dark red. The aril is pink. The taste is sweet. The seed toughness is soft.

(xix) İzmir 1445
The origin of this variety is Gümüldür (İzmir). Fruit rind colour is pink. The aril is pink. The taste is sweet. The seed toughness is soft.

Pomegranate is easily propagated by hardwood cuttings. It is not necessary to use hormones (Özgüven and Ak, 1993), and the fruits grow to a marketable size in a year. Pomegranate is generally planted in winter in Turkey, with the most common planting distance being 4×6 m.

The soil is only dug or cultivated in pomegranate orchards for weed control. Herbicides are sometimes used for this purpose, too.

Pomegranate plants have a strong tendency for producing more suckers. Therefore, it is advisable to prune the young plants in such a way that leads plants to give 3-4 main suckers. Topping of the plants 2-3 years after planting reduces fruit production. Pruning for fruit production increment is done just by trimming off excess branches and shoots, and also by cutting root sprouts and water sprouts. Heavy topwork can be done to renew plants.

Irrigation of pomegranate trees is very important. Fruit splitting and cracking are commonly seen, unless the plants are regularly irrigated with a proper amount of water. Excess watering may cause similar damage to the fruit. The pomegranate can withstand long periods of drought. Most orchards are irrigated under furrow system, but sprinkler and drip irrigation systems are used in some orchards in Turkey.

In general, pomegranate trees respond well to organic fertilisation. Some growers use organic fertilisation. Farmyard manure is generally used in Turkey. Commercial fertiliser needs of the plants varies according to given ecological conditions.

Rats are the most harmful rodents of pomegranate fruits. Beside the rats, aphids scale insects, Mediterranean fruit fly (*Ceratitis capitata*), pomegranate white flies, spider mites, and mealy bugs occasionally damage the plant to varying extents. Therefore it is necessary to control these insects. Fungi which cause rotting and reduction of fruit value are not yet known in Turkey.

The harvesting time for pomegranates varies from August to November in response to regions and cultivars. Harvesting should be done very carefully to prevent bruising and wounding. Grading, packing and transportation are important processes for marketing fruits. Pomegranate fruits can be stored for four months under optimum conditions (Onur, 1988; Özgüven, 1997).

References

Anonymous (1995). İGEME. External Trade Undersecretary, Export Developing Research Center, Ankara.
Anonymous (1996). *Tarımsal Yapı ve Üretim*. Governmental Statistic Institute, Turkey.
Anonymous (1997). http://www.hort.purdue.edu/newcrop/crops/pomegranate.html/Pomegranate

Ercan, N. Registered Pomegranate Varieties. Aegean Agricultural Research Institute, Menemen-İzmir. *Farmer Brochure*, 54.

Gözlekçi, Ş. (1997). *Investigations on fertilization, fruit development and maturation in pomegranate (*Punica granatum *L. Cv. Hicaznar).* PhD Thesis, Akdeniz University, Agricultural Faculty Horticultural Department, Antalya (unpublished).

Kumar, G.N.M. (1990). Pomegranate. In: *Fruits of Tropical and Subtropical Origin. Composition, Properties and Uses*, Steven, N., Shaw, P.E. and Wardowski, W.F. (eds). Florida Science Source (FSS) Inc., Lake Alfred, Florida, pp. 328-347.

Onur, C. (1983). *The selection in pomegranates in Mediterranean region*. PhD Thesis, Çukurova University, Agricultural Faculty, Horticultural Department, Adana, Turkey (unpublished).

Onur, C. (1988). Pomegranate growing. *Derim*, 5(4): 191.

Özgüven, A.I. (1997). World production status of pomegranate (*Punica granatum* L.). In: *2nd MESFIN Meeting on Plant Genetic Resources*, Madeira (Portugal), 5-8 August 1997 (in press).

Özgüven, A.I. and Ak, B.E. (1993). The effects of indole butyric acid (IBA) on rooting of pomegranate cuttings. *J. Agric. Fac. Ç.Ü.,* 8(3): 1-10.

Özgüven, A.I., Çetiner, S., Ak, B.E. and Yilmaz, C. (1997). The investigations on adaptation of different pomegranate varieties in Southeast Anatolia Region. 2. Stage Final Report. *J. Agric. Fac. Ç.Ü.,* 192.

Özgüven, A.I., Tatli, H., Coşkun, M. and Daşkan, Y. (1996). Fruit characteristics of some Mediterranean and Aegean pomegranate varieties under ecological conditions of Adana, Turkey. *Acta Horiculturae*, 441: 345-348.

Özgüven, A.I. and Yilmaz, C. (1998). The effects of some treatments on the fruit cracking and splitting in pomegranate (*Punica granatum* L.). In: *XXV International Horticultural Congress (IHC)*, Brussels, 2-7 August 1998.

Yilmaz, M., Özgüven, A.I, Çetiner, S. and Ak, B.E. (1993). A study on adaptation of different pomegranate varieties in Southeast Anatolia project., Pocket Certain Result Report. *J. Agric. Fac. Ç.Ü.,* 72.