J. Appl. Hort.,5(2):114-118, July-December, 2003

The economic and technical analysis of peach growing: A case study for Turkey

Sait Engindeniz, Figen Cukur and Dilek Yücel

The University of Ege, Faculty of Agriculture, Department of Agricultural Economics 35100 Bornova, Izmir, Turkey. Tel&Fax: +90 232 388 18 62. e-mail: engindeniz@ziraat.ege.edu.tr

Abstract

This study was carried out to determine the producers' conditions and some technical and economical characteristics of peach growing in Kemalpasa, Izmir. Main data were collected by interviewing with 63 peach growers of 4 villages selected by using random sampling method. In this study, average yield per hectare and average yield per tree were determined to be 16,848 kg and 37.7 kg. Average size of the peach orchard was found to be 1.09 hectares. It was observed that the growers preferred square planting with 4.5 m x 4.5 m spacing rather than triangle planting. Redhaven, Cresthaven, Triogem, and Dixired varieties had the biggest share in total peach tree. Input use and number of replications of cultural practices during production season were also determined in the study. It was observed that more than 82 % of peach growers harvested their crop themselves. Net return obtained per hectare and per tree from peaches was determined to be $ 839 and $ 1.88, respectively.

Key words: Peach, orchard, horticulture, marketing, cost

Introduction

Turkey lies in the 36-42^{o} north latitude and 26-45^{o} east longitude and possesses a wide range of climatic conditions from mild Mediterranean to cold continental that enable the cultivation of more than 75 crop species. Stone fruits comprise 15.4% of the total fruit production in Turkey. Peach ranks the first and in some years the second after apricot among stone fruits (Bas *et al.*, 2000). In 1960's peach was grown only in the Marmara Region whereas now, it is grown in the Aegean and Mediterranean Regions as well as various parts of the other regions. Due to the suitability of the climate, the obtained quality is rather high.

All peach varieties and types grown in Turkey belong to *Prunus persica*. It encloses economically significant varieties for table consumption and for canning or drying. There are some compact ornamental types of peach with white, red or darker coloured petals or dark red, purple or variegate colored leaves used for ornamental purposes. Peach is one of the most appreciated fruits in Turkey. Besides its fresh consumption all through the summer it is used in making marmalade, jam or jelly, canned as slices or processed as fruit juice and pulp. Varieties as Lovell and Muit are used in drying whereas Redhaven, Fairhaven, Kalhaven are used in deep-freezing. The fruit characteristics demanded by the Turkish consumers are symmetry, homogeneity in size, yellow flesh, free stone and attractive surface color (Ozbek, 1988).

The number of peach trees and peach production in Turkey is reported as 14,5 million and as 430,000 tons in 2001 (SIS, 2002). When compared to 1978 the increase in the tree number is calculated as 61% and in production as 74%. Among the major cities, Bursa ranks first with a share of 20%. Between 1967 and 1974, its share within Turkish peach production was around 40%. Following the development of industrial zones, some of the agricultural land was devoted to industry thus reducing the acreage of peach orchards. Icel in the eastern part of the Mediterranean region rose to the second place followed by Izmir, Canakkale and Aydin in the decreasing order. Turkish peach production shows fluctuations in some years due to frost that may occur as early spring frosts in Marmara Region, the main peach growing region. The average farm size in Marmara region is 10.64 ha and the plantation density is 450 per hectare.

The peach production has shown some fluctuations in some years however there is a steady increase between 1988 and 2001. According to statistics of Foreign Trade Export Promotion Center, Turkey exported 14,584 tones of peach fruit in 2000. Major markets are: Germany, Russia, Saudi Arabia, Kuwait, Austria and Romania. The production is projected as 551,974 tones for 2010 (Gülcan *et al.*, 1995).

In recent years, many studies have been made on economics of peach production (Dizdaroglu, 1985; Gercekcioglu and Esengün, 1991; Ergun *et al.*, 1992; Celebi, 1996; Ozcelik and Sayili, 1998; Cinemre and Kilic, 1999; Akcay and Uzunoz, 1999). Though, there is still need for study, especially at local level.

In this study, technical and economical aspects of peach production in Kemalpasa, Izmir were examined and problems of growers were determined. In economical analysis, cost and net return of peach production were calculated.

Materials and methods

This study consisted of surveyed data from peach producers in Kemalpasa, Izmir. Kemalpasa was selected according to the production share (20%) in Izmir province. Than four villages were selected from Kemalpasa and data have been collected from 63 producers by random sampling method.

The general cost items of peach production were classified as variable costs and fixed costs. The variable costs associated with

peach production were all inputs that directly relate to the production and covered labor and machine, material (fertilizer, pesticide, electricity, etc.) and transport costs. In this study, variable costs were calculated by using current input and labor wages.

Fixed costs are named as indirect costs, supplementary costs. Fixed costs included interest of total variable costs, administrative costs, annual depreciation costs, rent equivalent of land, land tax, and keeper fee. Interest on total variable costs was calculated by charging a simple interest rate of 12% (annual average nominal interest rate). Administrative costs were estimated to be 3% of the total variable costs. Annual depreciation cost was estimated using the straight-line method. Rent equivalent of land was estimated to be 5% of land value. Peach orchards were exempted from property tax and were not insured. In this study, total production costs were subtracted from gross return to calculate net return.

Results and discussion

Technical aspects of peach production: Peach trees are grown well in a wide range of soil types. A deep soil ranging from sandy loam to sandy clay loam in texture is preferred. Peach trees are extremely sensitive to poorly drained soils. In areas of poor drainage, roots will die, resulting in stunted growth and eventual death of the tree (Ferree and Krewer, 1996).

Before planting, the soil is prepared thoroughly by ploughing or spading followed by disking or raking to smooth the surface. If producer have not adjusted the soil pH to 6.5 previously, liming is done before producer prepare the soil so that the lime will be mixed throughout the planting area. When added to the surface and not ploughed in, lime takes years to move down into the soil. Phosphorus also moves down through the soil slowly and should be incorporated along with lime before planting if soil tests indicate a need (Ninkovski, 1984). 5-9, 10-14, and 15 year old trees form 52%, 25%, and 23% of examined peach plantations, respectively. Producers ploughed the soil average 3 times in examined peach orchards (Table 1).

Table 1. Soil preparing for examined peach orchards

Soil preparing	Number of operation	Time of operation (hour)
Ploughing	3.30	1.14
Spading	3.05	1.08
Bottom hoeing	1.46	1.58

There are peach varieties adapted to most areas of Turkey. Peaches have a chilling requirement of a certain number of hours of winter temperatures between 32° to 45° F to break dormancy and induce normal bloom and vegetative growth (Warmund, 2000). If varieties are chosen that have a chilling requirement that is too low, there is a greater probability that they will bloom early and be more subjected to frost. If the chilling requirement is too high, they may be very slow to break dormancy and abort fruit. Fruit characteristics need to meet certain minimum quality standards measured by size, shape, firmness, color, and flavor. The most adapted varieties by producers were Redhaven, Dixired, and Cresthaven in examined orchards (Table 2).

Selecting an appropriate orchard configuration will ensure easy equipment passage and reduce shading over the life of the orchard. Most growers have found that rows spaced 4.5 x 4.5 m is sufficient in examined peach orchards (Table 3). High density peach spacing has been tested in Turkey and in most cases, is not recommended.

Table 2. Peach varieties adapted by producers

Varieties	The number of peach producers (*)
Redglobe	13
Monroe	4
Cresthaven	20
Triogem	14
Loring	10
Dixired	23
J.H. Hale	7
Coronet	8
Redhaven	24
Nektared 6	1

(*) Some producers adapted more than one variety in the same orchards.

Table 3. Planting spaces selected by producer

Planting space	The number of producer	Peach orchard (ha)
4.0 m x 4.0 m	5	5.1
4.5 m x 4.5 m	23	24.1
5.0 m x 5.0 m	19	18.5
4.75 m x 4.75 m	5	6.0
5.5 m x 5.5 m	2	2.7
Others	9	12.5
Total	63	68.9

It is very difficult to grow top-quality peaches in the home orchard unless a rigid pest control program is maintained (Rader, 1985). Spray program begins with dormant sprays and carry on through the growing season. Pesticides used for examined peach orchards are given in Table 4. Average labor time was 72 hours per hectare for spraying of pesticides in examined peach orchards.

Table 4. Pesticides used for peach orchards

The name of pesticide	Effective material	Average use (per ha)
Marshall	Carbosulfan	877.3 ml
Durspan 4	Chlorpyrýfos-ethyl	565.7 ml
Supracide	Methidation	1359.2 ml
Gebutox	Dnoc ammonium	661.3 ml
Folidol	Parathion + methyl	228.6 ml
Winterwash	Oil + dnoc	64.3 lt
Bodeaux mixture	Cupper sulfate + hydrated lime	37.5 kg

Fertilizing peaches starts with adjusting the soil pH to 6.5 before planting (Chalmers, 1989).

To keep trees healthy and productive, nutrient levels should be maintained in the optimal range. The only way of accurately doing this is to monitor nutrient levels in both soil and foliage. Soil tests determine the initial nutrient needs and can help a grower maintain soil pH in the desired range. Although applying lime will easily raise soil pH levels, it is extremely difficult to lower pH levels in calcareous soils. Fertilization of fruit trees should be dictated by the pH of the soil in the absence of a soil test. A soil test should be run every 3-5 years. The ideal soil pH for peach production is between 6 and 7 (De jong and Goudriaan, 1989). Major problems with micronutrient deficiencies, especially iron and zinc, usually develop when the pH goes above 7.8. Fertilizers used for examined peach orchards are given in Table 5. Average labor time was 63 hours per hectare for fertilizing in examined peach orchards.

Table 5. Fertilizers used for peach orchards

Fertilizer		Average quantity used per tree (kg)
NPK	15-15-15	0.40
	20-20-0	0.38
Ammonium sulfate		0.23
Ammonium nitrate		0.20
DAP		0.18
Leaf fertilizer		0.10
Farmyard manure		24.40

In the past, most commercial peach orchards have been grown dryland with very wide spacings and only limited supplemental irrigation. Irrigation, if used, was generally done just before harvest to increase fruit size. With the advent of drip or trickle irrigation, irrigation concepts have changed dramatically. Today, it is not recommended that any peach orchard be planted on a site without suitable water, both in quality and quantity, for irrigation. Have the water analyzed for total soluble salts, sodium absorption ratio, bicarbonate and carbonate content, and pH before orchard establishment. Artesian or water well are generally used for irriation in examined peach orchards (Table 6). Average labor time was 138 hours per hectare for irrigation in examined peach orchards.

The main goals of pruning are to maintain tree form to an open center which facilitates light penetration and air circulation, and to partially control crop size by selectively thinning out fruiting wood (MSU, 1999). Peach trees bear fruit only on one year old wood. Dormant pruning is an invigorating action which results in a healthy canopy to produce the current season's crop and allow for ample production potential for the following year. Another pruning objective is to lower the fruiting zone to a height which can be hand-harvested from the ground. Additional objectives of pruning are to remove dead or diseased shoots, rootstock suckers, and vegetative water sprouts from the center of the tree. Average labor time was 39 hours per hectare for pruning in examined peach orchards.

Kemalpasa-grown peaches are consumed primarily within state and are hand harvested. Consumers demand dessert-type peaches that are ready to eat when purchased. This means that growers need to harvest fruits at a mature stage. This makes it important to exercise care in harvesting and handling. Harvest fruits when firm-ripe and well-colored with a red blush over yellow background. When harvested at this stage, fruits ripen properly and have excellent eating quality. Average labor time was 363 hours per hectare for harvesting in examined peach orchards.

Several types of containers are used for picking and hauling fruit, including half-bushel baskets, drop-bottom picking bags, wooden boxes, and plastic containers. The latter containers are about half-bushel size and are especially adapted for handling more mature fruit. They may be stacked several feet high on trailers without damaging fruit. Pads on the bottom of these containers help reduce fruit damage. Bruising is also lessened because the same container is used for picking and hauling operations (Kamas *et al.*, 1998).

Economic aspects of peach production: In this study, average yields of peach orchards were determined to be 16,848 kg/ha and 37.7 kg/tree (Table 7). However, in a similar study in Ohio, USA, average yields of peach orchards were determined to be 7,380 kg/ha (OSU, 2000). Especially, peach production per tree vary from region to region in Turkey. For example: in a similar study done in Tokat, Turkey, average yield per tree was determined to be 40.6 kg (Akcay and Uzunöz, 1999). However, in a study done in Samsun, Turkey, average yield per tree was calculated to be 39.1 kg (Cinemre and Kilic, 1999).

Table 6. Irrigation sources for peach orchards

Source of irrigation	Number of peach orchards
Artesian or well	61
State Hydraulic Works	1
Cooperative	1
Total	63
Number of average irrigation	10.19

Costs of growing peach include establishment and production costs. Establishment costs are spreading to three years as after establishment and before fruit bearing. Peach trees typically do not produce fruit until the third year or later. The items of establishment and before fruit bearing costs were given in Table 8. Establishment costs cover all the expenses that is relating with the period of the trees having productive capacity. These are generally related with the costs of labor and machines (maintenance, energy, etc). Establishment costs of first, second and third years were determined to be $ 2,355, $ 2,232, and $ 1,477, respectively. However, in a study done in Ohio, USA, before fruit bearing cost (for 2-3 years) per hectare was calculated to be $ 2,298 (OSU, 2000).

Production costs consist of both variable and fix cost. Productive years of peach had been accepted 20 years. The portion of labor costs on peach is extremely high (Table 9). Labor is used for maintenance, harvestings, classification and transport. Average production cost per hectare was determined to be $ 3,373. Variable costs were 56.2 % of total costs. In addition, labor, fertilizer, and pesticide costs were 45.3, 10.9 and 10.7 % of total variable costs, respectively. However, in a study done in Ohio, USA, Average production cost per hectare was determined to be $ 5,190 (OSU, 2000). In a similar study done in Florida, USA, it was estimated to be $ 12,375 (Crocker *et al.*, 1997).

Total production costs per hectare of peach were determined in similar studies in other regions of Turkey. But, results of these studies are different from one to one another. For example: in three studies done in Tokat, Turkey, it was determined to be $ 887 (Gercekcioglu and Esengün, 1991), $ 5,578 (Ozcelik and Sayili, 1998), and $ 2,663 (Akcay and Uzunoz, 1999), respectively. In a study done in Samsun, Turkey, it was calculated to be $ 3,857 (Cinemre and Kilic, 1999). However, in a similar study done in Bursa, Samsun and Izmir, Turkey, it was estimated to be $ 2,150 (Ergun *et al.*, 1992).

In this study, cost to produce 1 kg of peach was calculated to be $ 0.20 ($ 3,373/ 16,848 kg = $ 0.20). However, it was reported that the cost of production of 1 kg of peach were determined to be $

Table 7. Yield obtained from peach orchards

Total peach orchards(ha)	Average peach orchard (ha)	Number of trees (per ha)	Average peach production per orchard (kg)	Peach production per ha (kg)	Peach production per tree (kg)
68.9	1.09	447.2	18,347	16,848	37.7

Table 8. Establishment and before fruit bearing costs of peach orchards ($/hectares)

Cost items		Years		
		1	2	3
1. Variable costs	Ploughing	150	150	150
	Planting	113	11	-
	Sapling (450 each)	184	18	-
	Fertilize application	75	86	86
	Fertilizer	149	184	184
	Pruning and rarefing	61	84	102
	Irrigation	137	137	137
	Hoeing	94	94	94
	Pesticide application	100	122	122
	Pesticide	61	102	135
	Electricity	184	213	213
	Harvest and packing	-	-	45
	Wooden boxes	-	-	29
	Transport	-	-	30
	Total	1,308	1,201	1,327
2. Fixed costs	Interest of totalvariable costs (12%)	157	144	159
	Administrative costs (3%)	39	36	40
	Rent equivalent of land	820	820	820
	Land tax	16	16	16
	Keeper fee	15	15	15
	Total	1,047	1,031	1,050
3. Total establishment costs (1+2)		2,355	2,232	2,377
4. Gross production value (*)		-	-	900
5. Net establishment costs (3-4)		2,355	2,232	1,477

(*) 450 trees x 8 kg = 3600 kg peach x 0.25 $/kg = $ 900

Table 9. Production costs of peach orchards ($/hectares)

Cost items		Costs($)	(%)
1. Variable costs	Ploughing	174	5.2
	Fertilizer application	64	1.9
	Fertilizer	207	6.1
	Pruning and rarefing	133	3.9
	Irrigation	141	4.2
	Hoeing	75	2.2
	Pesticide application	74	2.2
	Pesticide	203	6.0
	Electricity	200	5.9
	Harvest and packing	372	11.0
	Wooden boxes	131	3.9
	Transport	123	3.7
	Total	1,897	56.2
2. Fixed costs	Interest of total variable costs (12%)	228	6.8
	Administrative costs (3%)	57	1.7
	Rent equivalent of land	820	24.3
	Annual depreciation costs (*)	347	10.3
	Land tax	10	0.3
	Keeper fee	14	0.4
	Total	1,476	43.8
3. Total costs (1+2)		3,373	100.0

(*) The economic life of peach plantations was estimated as 20 years.

0.22 in Samsun (Cinemre and Kilic, 1999), $ 0.16 (Akcay and Uzunoz, 1999) and $ 0.49 (Ozcelik and Sayili, 1998) in Tokat, Turkey. On the other hand, in a similar study done in Ohio, USA, it was estimated to be $ 0.70 (OSU, 2000).

Market emphasis is on consumer demand for high quality, tree-ripened peaches ready to eat when purchased. Today's peach market demands large fruit, preferably 2-1/4 inches in diameter or larger, free of insect and disease blemishes, and attractive, with good shape, color and maturity. Kemalpasa produces less fruit than is consumed within Izmir province. The presence of major metropolitan areas permits growers to take advantage of these prime markets without hauling fruit for long distances. Most peaches grown in the state are marketed by the individual grower. Growers utilize a number of market outlets, including sales to local supermarkets, roadside stands, brokers and wholesalers, as well as direct sales from orchards. Many growers market a large portion of their crop retail because of greater profits. Wooden boxes are used for wholesale marketing, but many growers utilize viol or smaller containers for retail sales.

In this study, it was observed that more than 82 % of peach growers (52 growers) harvested their crop themselves. 11 growers marketed their crops as direct sales on trees from orchards. According to results of this study, 63 % of total peach production was marketed in wholesale markets. However, 17 % and 2 % of peaches was sold as direct on trees and in local market places. The rest of peach production was sold to commission agents (8 %), dialers (8 %), fruit juice factories (1 %), and exporters (1 %).

In this study, average peach price that received by the grower was calculated to be 0.25 $/kg. It was determined that peach price varied between 0.10-0.49 $/kg. Average peach prices were determined to be 0.36 $/kg (Cinemre and Kilic, 1999) in Samsun, 0.27 $/kg (Akcay and Uzunoz, 1999) and 0.54 $/kg (Ozcelik and Sayili, 1998) in Tokat, 0.29 $/kg (Ergun *et al.*, 1992) in Bursa, Samsun and Izmir, Turkey. However, in a similar study done in Utah, USA, average organic and conventional peach prices were determined to be 1.85 and 0.70 $/kg, respectively (Rader *et al.*, 1985).

Gross return obtained per hectare from peaches was calculated to be $ 4,212 (16,848 kg x 0.25 $/kg) in this study. If total production costs were subtracted from gross return, average net return obtained per hectare from peaches can be calculated to be $ 839 ($ 4,212-$ 3,373). According to results of this study, there are average 447 trees in one hectare. Thus, average net return per tree was calculated to be $ 1.88 ($ 839/447). However, average net return obtained per hectare from peaches was estimated to be $ 671 (Ozcelik and Sayili, 1998) and $ 1,390 (Akcay and Uzunoz, 1999) in Tokat, Turkey.

In this study, problems that growers face during production and marketing stages were also determined as summarized in Table 10. This project has been successful in determining technical and economical problems of growers to produce high quality peaches. In peach production, success depends on how well the grower can manage the crop and make the right decisions at the right time. In addition, total supply, consumer demand, pricing, perishability of the product, and market structures are other factors that contribute to a grower's ability to sell his/her product. Therefore, production and market risks both affect the profitability and economic viability of peaches. Growers must evaluate circumstances to determine if the lower price usually paid by wholesalers and exporters is sufficient to cover production and handling costs and can be get a profit. According to this study, peach production may be profitable. But growers should gather all the economic data about the peach production,

and market conditions. Also producers should make investigations on other orchards and determine if peach production can be profitable.

Table 10. Problems of peach production and marketing

Problems during production	Problems during marketing
Increase of input prices	Increase of transporting costs
Ineffectiveness of pesticides	Decrease of peach prices
Increase of irrigation costs	Distance of wholesale markets
Lack of technical information of growers	Legal deductions in wholesale markets
Increase of credit interest	Irregular payments in wholesale markets
Variations of climate conditions	Lack of cold strage facilities
Rapid spread of insect and diseases	Lack of sales cooperative in the region

Peach growing is popular for the small growers of the region, especially where production space or farm equipment is limited. But, there are problems associated with peach production and marketing. Understanding the causes of problems can give some idea of the type of research that is needed to improve the production of peach. Some of suggestions to improve the production of peach in the region are summarized as : (1) the early varieties should be adopted, (2) standard planting spacings should be preferred, (3) grower should be informed about Integrated Pest Management, (4) contractual farming system should be developed, (5) Irrigation cooperatives should be improved, (6) Cold storage facilities should be constructed, (7) producer should be informed about crop insurance, (8) sales cooperatives should be established, (9) Credit limits should be increased and interest of credit should be decreased, and (10) organic peach production should be encouraged.

References

Akcay, Y. and M. Uzunoz, 1999. Investment Analysis in the Fruit Plantations: A Case Study of Central District of Tokat Peach Orchards. *Journal of Agricultural Faculty of Gaziosmanpaþa University,* 16(1): 99-117

Bas, M., M. Oztürk and S. Ufuk, 2000. Report of Peach, Fruit Report of Special Committee, The State Planning Organization, 8th Development Plan, pp. 204-238.

Chalmers, D.J. 1989. An Analysis of Growth and Productivity of Peach Trees. *ISHS Acta Horticulturae*, 254: 91-102.

Crocker, T., W.B. Sherman, T.D. Hewitt, J. Gordon and K. Ruppert, 1997. Alternative Opportunities for Small Farms: Peach and Nectarine Production Review, Cooperative Extension Service, Institute of Food and Agricultural Sciences University of Florida, 4 p.

Cinemre, H.A. and O. Kilic, 1999. A Research on Input Use, Economic Costs and Marketing of Peach Production in Carsamba District of Samsun Province. *Journal of Agricultural Faculty of Ondokuz Mayýs University*, 14(1): 117-132.

Celebi, O. 1996. Econometric Analysis of Peach Production in Bursa Province, Uludag University, M.S. Thesis, 121 p.

De Jong, T.M. and J. Goudriaan, 1989. Modeling the Carbohydrate Economy of Peach Fruit Growth and Crop Production. *ISHS Acta Horticulturae*, 254: 103-108.

Dizdaroglu, T. 1985. Economic Evaluation of Peach, Apricot and Plum Production in Menemen, Izmir. *The Journal of Agricultural Faculty of Ege University,* 22(3): 107-116.

Ergun, E., M. Burak and A. Safak, 1992. Economic Evaluation of Peach Production in Bursa, Izmir and Samsun Provinces. *Garden,* 21(1-2): 21-30.

Ferree, M.E. and G.W. Krewer, 1996. Peaches and Nectarines, Cooperative Extension Service, College of Agricultural and Environmental Sciences, The University of Georgia, 15 p.

Gercekcioglu, R. and K. Esengün, 1991. A Study on Peach Production Inputs and Its Cost in Tokat Province. *Journal of Agricultural Faculty of Cumhuriyet University,* 8(2): 143-148

Gülcan, R. *et al.* 1995. Production Target and Consumption Projection of Pome and Stone Fruits, Fourth Technical Congress of Turkey Agricultural Engineering, January, 9-13, 1995, Ankara, pp:629-654.

Kamas, J., G.R. McEachern, L. Stein and N. Roe. 1998. Peach Production in Texas, Texas A&M University, Cooperative Extension Service, 10 p.

Ninkovski, I. 1984. Sugars, Forms of Sugars and Acids in Stone Fruits Grown in Belgrade Region. *Nauka Piaksi*, 14(1): 49-62.

Nyeki, J. and Z. Szabu, 1989. Effect of Frost Damage on Peach Varieties in Hungary. *ISHS Acta Horticulturae*, 254: 255-256

Ozbek, S. 1988, *General Fruit Growing,* Publications of Cukurova University, No. 31, Adana

Ozcelik, A. and M. Sayili, 1998. A Research on the Determination of the Cost of Peach Production in the Centre Country of Tokat Province, Third Sector Cooperation, 121:5-21.

Rader, J.S., R.H. Walser, C.F. Williams and T.D. Davis, 1985. Organic and Conventional Peach Production and Economics. *Biological Agriculture and Horticulture*, 2: 215-222

State Institute of Statistics (SIS), 2002. The Summary of Agricultural Statistics (1982-2001), Publication Number: 2719, Ankara

Warmund, M.R. 2000. *Home Fruit Production: Peach and Nectarine Culture*. Department of Horticulture, University of Missouri-Columbia, 6 p.