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Fig Production and Germplasm in Turkey

Emine Tanriver

Abstract

Turkey is one of the most important genetic origins of fig (*Ficus carica* L.) in the world, and it extended to the Mediterranean countries (Spain, Italy, France, Greece, Tunisia, Morocco, Algeria, Portugal.), USA, Syria, Iraq, Iran, Saudi Arabia, South Caucasia, and Crimea. Fig germplasm in Turkey is located mainly at the Big Meander Valley and Small Meander Valley in the Aegean Region but also widely seen in the Southeast Anatolia, the Marmara, and the Mediterranean regions. Siirt, Bottan, Diyarbakir, Elazig, Gaziantep, Besni, Kahramanmaras, Ceyhan, and Ahir Mountain are the main fig germplasm locations at the Southeast Anatolia and the Mediterranean regions. These germplasm (285 fig cultivars and genotypes) are mainly collected at the orchards of Erbeyli Fig Research Institute in Aydın Province. Fig production of Turkey is about 305.689 tons in 1.152.799 tons of world fig production. Turkey is the biggest fig-producing country and is followed by Greece, the USA, Italy, Portugal, and Spain. Dried figs (mainly Sarilop cultivar) are obtained from Aydın Province in the Aegean region, while fresh figs are obtained from the Marmara and Mediterranean regions.

Keywords: Turkey, fig, germplasm, production

1. Introduction

There are eight germplasm centers in the world which are (1) China; (2) India, Malaysia, and Thailand; (3) Middle Asia; (4) Near East; (5) Mediterranean; (6) Ethiopia; (7) South Mexico and Middle America; and (8) South America. Turkey is located both very close to the Near East and the Mediterranean basins [1, 2]. This shows the importance of Turkey as a plant germplasm center. The reason of this rich germplasm in Turkey is mainly based on the suitable ecological conditions for horticultural plants, the presence of the country on the migration routes, and Anatolia being a place where many civilizations have occurred since the first ages of the history. So, Turkey is one of the main origins of many fruit species as well as fig which was especially located at the Anatolian part of the country [3]. Some of the main fig-growing provinces are given in **Table 1**.

Ficus is a genus belonging to the Moraceae family and contains more than 800 species, among which *Ficus carica* is one of the most important edible ones [4]. Fig culture in Anatolia has begun from the very beginning of the cultural history of the human being. Fig (*Ficus carica* L.) is extended from Anatolia to the Mediterranean countries, Syria, Iraq, Saudi Arabia, South Caucasia, and Crimea. *Ficus* also originated in Egypt, India, and South China. California in the USA, South and South West Africa, and East Australia are the later cultural centers of *Ficus carica*. Fig is a special fruit called syconium, grown in temperate, subtropical, and tropical climates.

Provinces	Area (da)	Production (ton)	Yield per tree (kg)
Aydın	365.366	182.775	30
İzmir	80.778	43.741	29
Bursa	21.136	25.734	76
Mersin	3.756	7.202	62
Hatay	1.677	6.535	30
Antalya	1.377	4.319	36
Gaziantep	7.226	2.913	42

Table 1.
The production area and the yield in fig-growing provinces.

No	Name	No	Name	No	Name	No	Name
1	Göklop	30	Ada	59	Yediveren	88	Darpak
2	Bardakçı	31	Datça 5	60	Kızıl yemiş	89	Kızıl mor
3	Kuşadası Bardakçı	32	Siyah incir	61	Gök incir	90	Ekşi incir
4	Mor 1	33	Yediveren	62	Güzlük mor	91	Beyaz incir3
5	Kara Yaprak	34	Siyah	63	Haziran inciri	92	Siyah incir
6	Akça 2	35	Susak	64	Kış hayrı	93	Şeker inciri2
7	Akça 3	36	Sarı yemiş	65	Halebi	94	Melli
8	Bardak	37	Gelin yanağı	66	Azezi	95	Abbas
9	Mor 4	38	Dereköy	67	Sarı incir	96	Mut
10	Asıl bardak	39	Löp inciri	68	İstanbul inciri	97	Yeyiğgüz
11	Sarılop	40	Midilli	69	Ak incir	98	Beyazorak
12	Morgüz	41	Mor incir	70	Kara sultani	99	Siyahorak
13	Karabakunya	42	Bodrum inciri	71	Baldırcın	100	Divrek kara
14	İzmir Bardakık 2	43	Armut sapı	72	Deniz inciri		
15	Bursa Siyahı	44	Mor armudi	73	Tabak inciri		
16	Sultan Selim	45	Kızıl mor	74	Turnaboyu		
17	Yediveren	46	Kırmızı incir	75	Dilaver		
18	Beyaz Seyhan	47	Kış inciri	76	Ham incir		
19	Şeker inciri	48	Yayladağ	77	Ak incir 1		
20	Morgüz	49	Aşı inciri	78	Kara incir 2		
21	Sarı çiçek	50	Osmaniyeli	79	İpek inciri		
22	Siyah kış	51	Lebi	80	Değirmen inciri		
23	Esmer bal	52	Tarak inciri	81	Ağarsak		
24	Siyah lop	53	Fetike inciri	82	Sarı incir2		
25	Datça 1	54	Lop inciri	83	Beyaz incir2		
26	Şeker	55	Gök incir	84	Kara incir3		
27	Mor bardakçı	56	Frenk inciri	85	Kabak inciri		
28	Beyaz incir	57	Kilis inciri	86	Kilis inciri1		
29	Gökçe	58	Beyaz yemiş	87	Sarı kilis		

Table 2.
Some fig cultivars at the collection plantations at Erbeyli Fig Research Institute.

Fig is a sacred fruit from the very historical times in three of the religions. Fig has high nutritional and medicinal value with the phenolic compounds, antioxidant content, vitamins, amino acids, minerals, etc.

In Turkey, fig culture is seen in almost every part of the country except the very continental climatic areas of the Middle and East Anatolia. Southeast Anatolia is very rich with fig germplasm. High extension of *Ficus carica* in Anatolia, from BC, caused the occurrence of wild genotype *F. carica* erinosyce and two other cultural forms, *F. carica* caprificus (male fig) and *F. carica* domestica (female fig). There are some other *Ficus* species and forms in Anatolia such as *F. palmata* Schweinf; *F. c. var. rupestris*, Hauska; *F. carica* var. *kurdica*, Kotschy; *F. carica*. Var. *domestica*, Tschirch; *F. carica* var. *riparium*, Hauskn; and *F. carica* var. *Johannis*, Boiss [5].

Almost all the coastal lines of the country such as Aegean, Mediterranean, Marmara, and Black Sea regions are the main areas for fig production. However, the best dry fig is grown at the Big Meander Valley and Small Meander Valley of the Aegean Region with a wonderful quality. In this area there is an institute (Erbeyli Fig Research Institute) of the Ministry of Agriculture and Forestry mainly carrying on *Ficus* research at the orchards with 285 fig cultivars and genotypes (Table 2).

According to the statistical data, among 1.152.799 tons of world fig production, Turkey takes the first place with 305.689 tons of total fig production. It was followed by Egypt with 176.000 tons, Algeria with 128.620 tons, and Morocco with 126.554 tons. The amount of dried figs are 72.000 tons among 127.500 tons of world dry fig production [1]. Dry fig exportation of Turkey is 42.227 tons, and supply is more than 60% of dry fig demand of the world. Total fig exportation of Turkey was about 63.7% of the world total fig exportation [6]. The area, production, and yield per tree considering the main fig-growing provinces are given in Table 2 [7].

Some of the nutritional values of dry fig are 11.6 g carbohydrates, 1.2 g protein, 0.5 g fat, 1,8 g fiber, 6.4 mg vitamin A, 2.0 mg vitamin C, and 0.5 mg iron in 20 g of dry fig fruit.

2. Pomological classification and cultivars

Fig is divided into three groups for the fertilization biological characters: (a) male figs, (b) dried figs, and (c) fresh figs. The male figs take part in *F. carica* caprificus; the other two female figs take part in *F. carica* domestica.

- a. Male figs contain both male (for pollen production) and short-styled female (gall) flowers, in which fig wasp (*Blastophaga psenes* L.) is grown up. Male fig fruits cannot be eaten, only used for pollen and fig wasp production.
- b. Dried figs contain only long-styled female flowers in the receptacle of the syconium. This group of fig cultivars need pollination for the fruit set (Smyrna type, both breba and main crops require caprification). Sarilop fig cultivar is the main cultivar of this group.
- c. Common or fresh figs contain only long-styled female flowers; however, this group of figs does not require pollination; both breba (spring crop) and main (summer crop) crops are parthenocarpic. However, some cultivars in this group need pollination for summer or autumn crop. San Pedro (while breba crop does not require caprification), main crop requires caprification [8–11]).

Caprification is to hang a profichi syconium on the branches of female trees for pollination. Caprification is very important in Smyrna-type figs. Fig wasp

(*Blastophaga psenes* L.) which is a pollination vector has a symbiotic life cycle with *F. carica*. Caprification is compulsory for cultivars like Sarilop (Smyrna type) to set economically satisfying fruit [12–14].

3. Fig research and selection studies

In the Aegean part of the country, fig is mostly grown for dry production and exportation. So, most of the research in this area was carried on the performances of dry figs, mainly on Sarilop fig cultivar. However, the increase on the exportation and transportation possibilities of fresh figs caused to work on them (such as Bursa Siyahi fig cultivar) as well. Many studies were carried out to develop fig cultivation in the country. Kaska et al. [15, 16], Kuden and Tanriver [17], and Tanriver et al. [18] worked on fertilization biology and physiology of selected fig genotypes under Cukurova conditions.

First fig selection studies have begun from the end of the 1980s with Aksoy [19] and in the 1990s with the studies of Aksoy et al. [20] at Ege University and Erbeyli Fig Research Institute and Kaska et al. [13] at Cukurova University. Kuden et al. [21], collected 38 fresh commercial fig cultivars from Southeast Anatolia region and 32 fresh commercial fig cultivars from the East Mediterranean region. They have also carried out another selection study on figs and collected and identified very promising genotypes [22]. Ilgin and Kuden [23] also identified fig germplasm in Kahramanmaraş Province. All these selection studies were presented during the MESFIN network meeting [24].

Several Ms.C theses were carried out on fig selection [25–41] and also Ph.D. studies [19, 42–46]. Several selection, germplasm characterization, and cultivar identification studies were carried out by different scientists [47–50].

4. Conclusion

Fig (*Ficus carica* L.) is mainly spread in the subtropical climatic countries in the world. However, in Turkey fig is grown not only in subtropical climates, but it could be grown in less subtropical or even mild continental climatic areas. Anatolia is one of the oldest genetic origins of figs. Cultural forms of *Ficus carica* erinosyce, *Ficus carica* domestica, and *Ficus carica* caprificus are located especially in the Aegean Region having parallel life cycles with wasp (*Blastophaga psenes*) to have a special fertilization biology for figs. Three receptacle bearings occur both in male (profichi or spring crop, mammoni or summer crop, mamme or winter crop) and female (fiori or spring crop, pedagnuoli or summer crop (maincrop), cimaruali or autumn crop). Fig wasps live inside the gall flowers in male figs and become adult and fly away from them taking pollen and enter inside the female flowers and cause the pollination.

In conclusion, Turkey has the best ecological conditions for fig production. There are 285 fig cultivars and genotypes under protection at the Ministry of Agriculture and Forestry and Erbeyli Fig Research Institute in Aydın Province. These elite plant materials were collected from the different parts of the country, since Anatolia has been the main genetic origin of fig (*Ficus carica* L.).

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