Present status and future prospects of the cultivation in Greece of the plants: fig, loquat, Japanese persimmon, pomegranate and Barbary fig

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in

Llácer G. (ed.), Aksoy U. (ed.), Mars M. (ed.).
Underutilized fruit crops in the Mediterranean region

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 13

1995
pages 21-30

Present status and future prospects of the cultivation in Greece of the plants: fig, loquat, Japanese persimmon, pomegranate and Barbary fig

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SUMMARY - Fig occupies an area of 9,000 and 700 hectares for dried and fresh fruit production respectively as organised orchards. Furthermore, there are about 1.5 million scattered trees for both dry and fresh fig production. The total annual production is about 30,000 and 20,000 tons of fresh and dry fig, respectively, and about 50% of the dry fig production is exported. The existing 150,000 loquat trees produce about 2,500 tons of fruits consumed locally, but only 15,000 trees belong to regular orchards occupying about 75 hectares, while the remaining 135,000 are scattered. About 180,000 Japanese persimmon trees are scattered in the home gardens. Organised pomegranate orchards occupy an area of 100 hectares (25,000 trees),and in addition to these, about 230,000 scattered trees also exist. Barbary fig trees exist as scattered in the dry areas of southern Greece. There is an interest for expanding the cultivation of these crops.

Key words: Greece, culture, fig, japanese persimmon, loquat, pomegranate, Barbary fig.

RESUME *- En Grèce, la culture du figuier occupe en vergers réguliers, 9 000 ha produisant des figues sèches et 700 ha produisant des figues fraîches. En plus, 1,5 millions d'arbres dispersés sont recensés et produisent à la fois des figues consommées en frais et des fruits pour le séchage. La production annuelle s'élève à 30 000 t de figues fraîches et 20 000 t de figues sèches. La moitié de la production totale est exportée. Il existe, aussi, près de 150 000 pieds de néflier du Japon produisant 2 500 t de fruits destinés à la consommation locale. Les vergers réguliers occupent 75 ha et comptent 15 000 pieds uniquement. Le reste se trouve sous forme d'arbres dispersés. Le nombre total de plaqueminiers est estimé à 10 000 arbres dispersés dans les jardins familiaux. Les plantations régulières de grenadier occupent 100 ha et comptent 25 000 arbres. Les grenadiers dispersés dans les vergers et jardins sont estimés à 23 000. Les figuiers de Barbarie, également, se trouvent dispersés dans les régions arides du sud de la Grèce. Il est d'un grand intérêt d'étendre la culture de ces cinq espèces fruitières.*

Mots-clés *: Grèce, culture, figuier, néflier du Japon, plaqueminier, grenadier, figuier de Barbarie.*

Introduction

Greece has a population of approximately 10 million inhabitants and an area of 132,000 km^2. The topography shows a wide variation, and the climatic conditions change from place to place. Horticultural crops play an important and major role in the agriculture of the country. Greece has suitable climatic conditions for the cultivation of many kinds of fruits even tropical and subtropical ones. Thus, there are many areas in Peloponnissos, in Crete, in the Ionian and Aegean islands and in the Central Greece where the winter is very mild, and the absolute minimum temperature never

falls below 0°C or drops to a few degrees below 0°C for a very short time. The temperature characteristics in five different places of Greece, in Chania, Rhodos, Kalamata, Corfu and Lamia is shown in Figure 1 (National Meteorological Service of Greece, 1981).

The fruit trees, fig-loquat-Japanese persimmon-pomegranate and Barbary fig, are cultivated in Greece for many years but only the fig occupies some area and has a significant economic importance for the country while the cultivation of the others is very limited and more or less restricted mainly for family consumption. Because of the existing difficulty in selling other traditional fruits (citrus, peaches, apricots, etc.) there is recently a growing interest by the farmers to expand the cultivation of the above crops. Greek research institutions have included these crops in their research programmes in order to help the farmers to obtain the best results.

Fig *(Ficus carica)*

In Greece about 4 million fig trees are cultivated. From these, about 2 million trees are for dry fig production and 2.5 million for fresh fig production. The organised orchards occupy an area of 9,000 and 700 hectares for dry and fresh fruit production respectively, while there are another 1.5 million scattered trees for both dry and fresh fig production planted mainly on the borders of olive, almond or grape orchards. The total annual production is about 30,000 and 20,000 tons of fresh and dry figs respectively (National Statistical Service of Greece, 1981; 1986).

The fig tree is cultivated almost everywhere in Greece, from the northern areas of Macedonia and Thraki to the southern areas of Crete, but the majority of fig cultivation exists in Peloponnissos (areas of Messinia, Arkadia, Lakonia), in Evia (area of Kimi) and in the Aegean islands (mainly Lesvos, Andros, Naxos, Samos) (Fig. 2). Table 1 shows the areas of fig cultivation in Greece with the corresponding quantities of dried and fresh fruit production.

A number of about 25 local fig varieties have been selected and evaluated from the existing local fig population (Davidis, 1977; Sfakiotakis, 1985; Pontikis, 1987). Table 2 shows the most important of these local varieties with their main characteristics. However among the existing fig population, many other fig clones exist but their commercial output is not yet evaluated. According to the colour of the fruit, the existing varieties are placed into two groups, those with white and those with coloured fruits. In each group, some varieties produce one yield while the others two yields per year. The fig cultivars 'Kalamon' and 'Kimis' are two of the most important local ones with white fruits suitable for dried fig production, although both cultivars are also consumed as fresh. 90% of the dried fig production in Greece is produced in Peloponnissos from the cultivar 'Kalamon' mainly. There is recently an interest from the farmers in Peloponnissos to establish new plantations especially for fresh fig production (J.A. Karidis, pers. comm.).

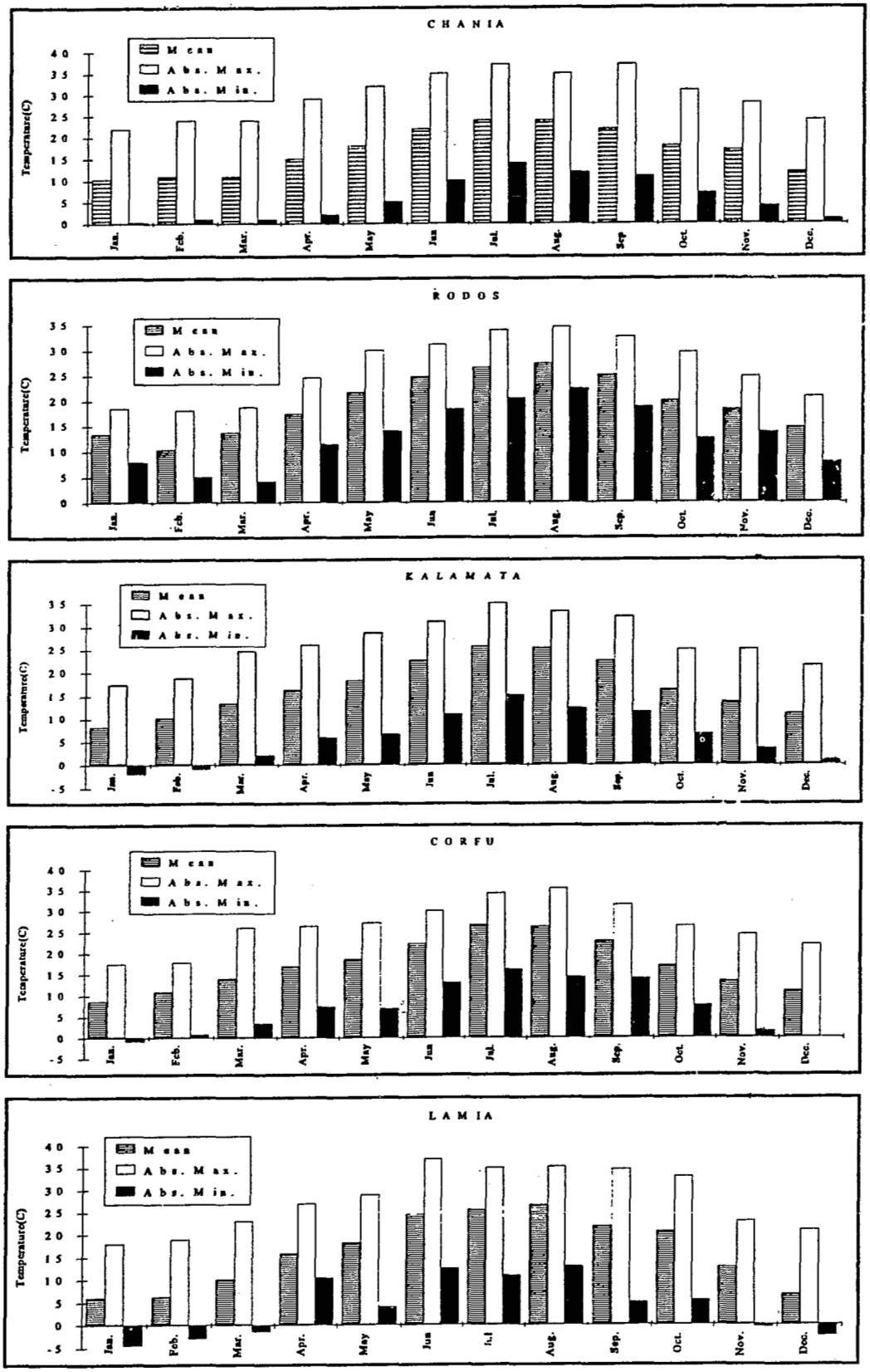

Fig. 1. Temperature characteristics in five different places in Greece (Chania, Rhodos, Kalamata, Corfu and Lamia) during the years 1971-1980.

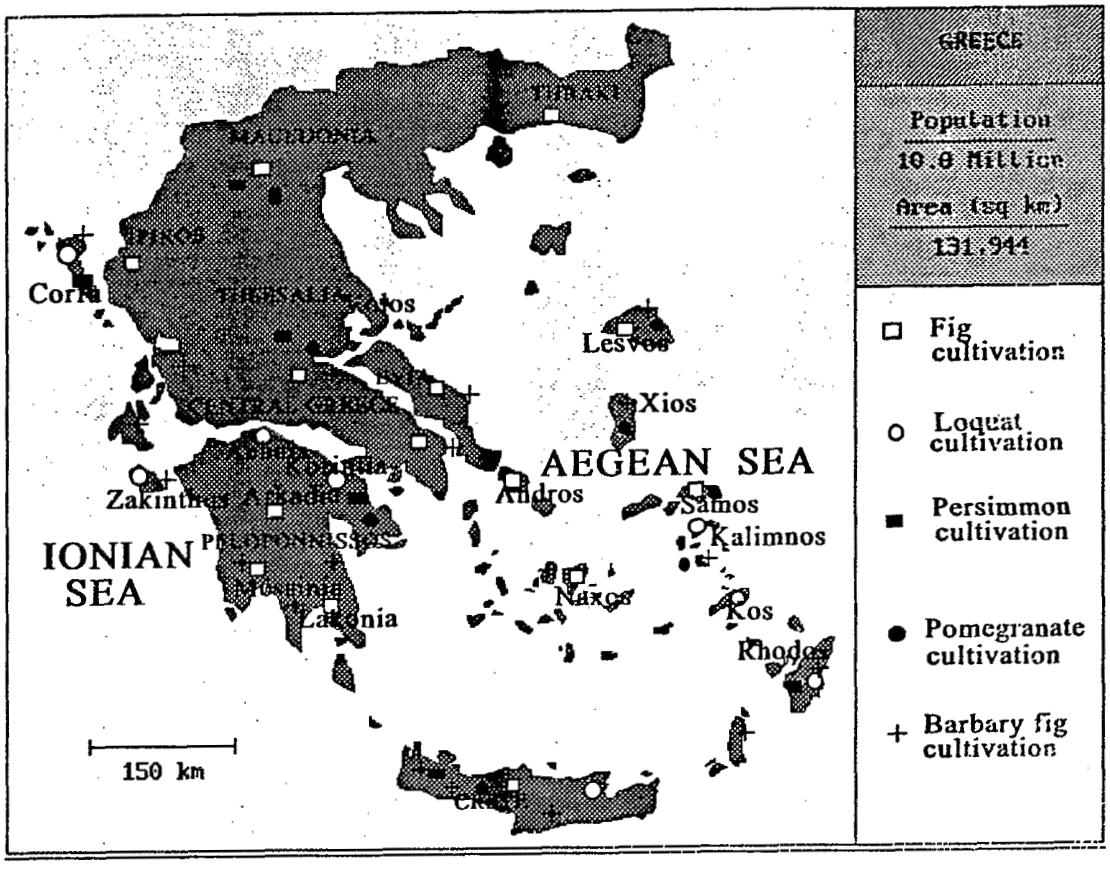

Fig. 2. Places in Greece where fig, loquat, Japanese persimmon, pomegranate and Barbary fig are cultivated.

The usual way of propagation is by rooting hardwood cuttings. The cuttings being 20-30 cm long and 1-2 cm thick are taken late in autumn or early in the spring either from the terminal part of the shoots or from the two years old wood and are rooted in the nursery. The planting distance in the orchard is 8-10 X 8-10 m. The plants can be trained either as a shrub or as a tree but the most usual shape is the tree-shape with a main trunk having 3-5 primary scaffolds. Pruning consists of thinning and shortening the shoots, however pruning is not done regularly. For the pollination of fig trees for dried fig production only, fruits of a wild fig tree (profichi) is used. For each female tree, 30-90 profichi fruits are needed per year. The wild figs are harvested when they are 15 mm in diameter and placed inside the foliage of the fig trees 2 to 3 times (15-30 figs per tree each time) from the end of May till the beginning of July (Davidis, 1977; Vasilakakis and Therios, 1990). In Peloponnissos, the main area of fig cultivation, the plants are fertilised during the winter months, usually with 80-50-100 units of nitrogen-phosphorus-potassium respectively per hectare. Usually the plants are not irrigated while the weeds are controlled either by soil cultivation or by herbicides; furthermore the plants are sprayed only for the control of *Ceroplastes rusci* (J.A. Karidis, pers. comm.).

Table 1. Areas of fig cultivation in Greece with corresponding fresh and dried fig production (National Statistical Service of Greece, 1981; 1986)

Geographic area		Fresh fig production (tons)	Dried fig production (tons)
Central Greece	1981	6.910	1.033
	1986	6.951	1.869
Peloponnissos	1981	9.299	16.627
	1986	8.327	14.873
Ionian islands	1981	3.131	6
	1986	2.345	8
Ipiros	1981	2.338	93
	1986	1.632	50
Thessalia	1981	1.627	526
	1986	1.229	65
Macedonia	1981	2.526	2
	1986	2.086	30
Thraki	1981	275	--
	1986	242	--
Aegean islands	1981	2.259	2.528
	1986	2.234	1.836
Crete	1981	2.780	212
	1986	2.854	131
TOTAL	1981	31.145	21.063
	1986	27.635	18.862

The total fresh fig production and about 50% of the dried fig production are sold in the domestic market while the remaining 50% of the dried fig production is exported mainly to the USA and Germany as dry figs or as fig-paste. The cooperative of fig producers which has 15,000 members from the areas of Messinia, Lakonia, Arkadia, Evia and the island Lesvos, has installations in the above areas for disinfection, packing and processing of figs. The drying of figs is done under the sun while the disinfection is carried out with methyl bromide gas at a concentration of 25 gr/m^3 volume (Davidis, 1977).

The research work carried out in Greece on figs is mainly concentrated in the topics of cultivar evaluation and adaptation studies for local and foreign material as well as in problems related to pruning, pollination and early fruit maturity. Cultivar collections exist in three research institutions of the National Agricultural Research Foundation (NARF) of Greece and in one University. The Olive, Fruit and Vegetables Institute of Kalamata in Peloponnissos keeps a fig collection of 31 local and 28 foreign cultivars with 3-5 self-rooted trees per cultivar of age 9 to 13 years old; this institute keeps also two experimental fig plantations, one of the local cultivar 'Kalamon' (98 self-rooted 15 years old trees at 6 x 6 m spacing) and one of a foreign cultivar, 'Mission' (55 self-rooted 11 years old trees at 6 x 6 m spacing) (J.A. Karidis, pers. comm.). The Agricultural Research Station of Rhodes in the Aegean sea has a collection of 5 local

and 3 foreign cultivars with 6-8 self-rooted 4 years old plants per cultivar (X. Papanikolaou, pers. comm.). The Pomology Institute of Naoussa in Macedonia maintains a collection of 18 local and 4 foreign cultivars with two 6 years old trees per cultivar (K. Tsipouridis, pers. comm.). Finally, the Agricultural University of Athens maintains a fig collection of 10 local and 6 foreign cultivars 15-30 years old (Pontikis, 1987).

Table 2. The most important Greek fig varieties cultivated in Greece and their main characteristics

Cultivar name	Fruit colour	Yields per year	For dry or fresh consumption	Harvest period (month)
1 'Kalamon'	white	1	dry - fresh	Aug. - Sept.
2 'Kimis'	white	1	dry - fresh	Aug. - Sept.
3 'Vasiliki White'	white	1	fresh	August
4 'Vasiliki Black'	coloured	1	fresh	August
5 'Votanikou Black'	coloured	2	fresh	May/August
6 'Argalastis'	white	1	fresh	August
7 'Fragasana'	white	2	fresh	May/August
8 'Apostoliatika'	white	2	fresh	May/August
9 'Politiko'	white	1	fresh	August
10 'Livano'	white	1	fresh	August
11 'Prasinosikia Lesvou'	white	1	fresh	August
12 'Kanates'	coloured	1	fresh	July
13 'Delonika Naxou'	white	1	fresh	October
14 'Boukia Samou'	coloured	2	fresh	May/August

Loquat *(Eriobotrya japonica)*

Loquat was introduced in Greece in the middle of last century. It is cultivated mainly with citrus and olives, in the northern Peloponnissos (areas of Korinthia and Achaia), in Crete (mainly in eastern Crete), in the Aegean islands (mainly in Rhodos, Kos, Kalimnos) and in the Ionian islands (mainly in Corfu) (Davidis, 1977) (Fig. 2).

About 150,000 loquat trees are present and produce about 2,500 tons of fruits per year. Only 15,000 trees belong to regular orchards occupying about 75 hectares, while the rest (135,000 trees) is scattered in citrus orchards mainly (National Statistical Service of Greece, 1989). The organised loquat orchards are mainly located in the areas of Korinthia, Corfu and eastern Crete. The production has remained more or less constant during the last 35 years (Lionakis, 1986). Table 3 shows the annual loquat production during the years 1984-1992.

Most of the scattered loquat trees are seedlings while the trees of the organised orchards are grafted with the desired cultivars on loquat seedlings. The existing cultivars have been selected by the farmers from seedlings cultivated locally. There

are many local varieties originating from seedling trees. These have been selected according to the quality of the fruit (number of seeds per fruit, large fruit size, early maturity). The local cultivars are grouped in two categories, those with round fruits and those with oval fruits. The most common local cultivars are known with the names 'Rozenon', 'Troulotis' and 'Koilarato'; the first cultivar is cultivated in Korinthia area while the other two in Crete (Dimoulas *et al.*, 1993).

Table 3. Loquat production in Greece during the years 1984-1992

Year	Fruit production (tons)
1984	2.660
1985	2.572
1986	2.948
1987	2.440
1988	2.892
1989	2.513
1990	2.473
1991	2.684
1992	2.550

The existing organised orchards are small in size and each range from 0.1 to 0.5 hectares. The spacing is 5-6 m x 5-6 m. Soil cultivation, irrigation, pruning, fertilisation and control of *Fusicladium dendriticum* var. *eriobotryae* are carried out in the organised orchards but not always for the scattered trees. Fruit thinning, for the improvement of fruit quality, is not practised. The production per tree is 30-40 kg for the organised orchards and 10-15 kg for the scattered trees.

The total production is sold as fresh fruit in the local market. Fruits appear in the market in early April and are sold at high prices since there are not many other fruit species in the market at that time. In the fruit shops, the fruits are usually placed in big trays of about 10 kgs each. However, during the last two years, some farmers could get higher prices by grading the fruits in sizes and selling them in small trays of 1 kg.

Many farmers are recently interested in cultivating loquat as an alternative crop because of the difficulty in selling other fruits, and thus there is a need for better loquat cultivars. For this reason, the Subtropical Plants and Olive Trees Institute of Chania has included the loquat in its research programmes. From a survey, carried out by the Institute two years ago, six loquat clones were selected from the loquat germplasm existing in Crete and then grafted onto loquat seedlings and planted in the cultivar collection of the Institute in Chania. The selection of important loquat clones will be continued from the loquat germplasm existing in the other places of Greece. In addition, foreign loquat cultivars will be included in the existing collection.

Japanese persimmon *(Diospyros kaki)*

The cultivation of Japanese persimmon in not systematic in Greece; about 120,000 trees are planted in homeyards and in the orchards of other fruit trees. Japanese persimmon trees are found in many areas of Greece even in the north since the plant can survive at -18°C (Fig. 2).

The majority of the existing trees are grafted with selected local cultivars on seedlings of the same species. Many local varieties are selected by the farmers for their good fruit quality, the existence of seeds in the fruit and the period of fruit maturity; however the existing genetic material is not studied and evaluated yet.

The fruits are harvested during the period between September-November. At harvest the fruit flesh is hard and has an astringent taste; one to two months after harvest, when the fruit flesh becomes soft and the astringency disappears, the fruits are ready for consumption. The fruits of Japanese persimmon are mainly consumed by their producers but a small quantity is sold in fruit shops at high prices. Recently some farmers of central and southern Greece have shown interest to establish commercial orchards (G. Zakinthinos, pers. comm.).

The Japanese persimmon is included in the research programme of the Subtropical Plants and Olive Trees Institute of Chania and in the near future, the Institute is going to begin some activities on the selection, evaluation and adaptation of local and foreign cultivars.

Pomegranate *(Punica granatum)*

The cultivation of pomegranate is known in Greece since the prehistoric years. Nowadays, it is cultivated in many places of Greece and mainly in the Aegean islands (Xios, Lesvos, Samos, Rhodos, Kalimnos, Kos), in Crete, in Peloponnissos (Argos, Astros), in Central Greece (Lamia) and in Macedonia (Veria, Edessa, Pella) (Pontikis, 1987) (Fig. 2). The cultivation is very limited, thus about 265,000 trees exist but only 25,000 trees belong to organised orchards occupying a total area of 100 hectares while the remaining 240,000 trees are scattered within other fruit orchards; the annual production is about 2,750 tons (National Statistical Service of Greece, 1989).

The existing pomegranate trees were propagated either by hardwood cuttings, 30 cm long, taken early in spring from 1-2 years old shoots and then rooted or by sucker shoots which already carry roots. About 35 local cultivars are described by the names that originate either from the colour of the fruit or from the place of cultivation; all these cultivars were selected from the existing local seedling population. The Agricultural Research Station of Rhodos in the Aegean Sea has a collection of 5 local cultivars with 13 self-rooted plants per cultivar - 11 years old (X. Papanikolaou, pers. comm.), while the Pomology Institute of Naoussa in Macedonia maintains a collection of 30 local cultivars with 2 self-rooted trees per cultivar- 5 years old (K. Tsipouridis, pers. comm.).

A part of the production is sold in the local market while the remaining is consumed by the producers. The fruits are harvested during September-October and are eaten either as fresh or stored in well aerated rooms and consumed during the following 9 months.

Barbary fig *(Opuntia ficus-indica)*

The Barbary fig is not cultivated systematically in Greece and thus organised orchards of the plant do not exist; it is usually found in the margins of the fields or in homeyards either as individual plants or as groups of plants planted in a row to form a fence. The plant shows the best adaptation in coastal areas where the weather is dry and hot. Thus it is found in the coastal areas of central Greece (Evia, Atiki, Lamia, Preveza) and Peloponnissos (Lakonia, Messinia, Ahaia, Korinthia), in Crete, in most of the Aegean islands (Rhodos, Kalymnos, Samos, Lesvos, Skiros, Paros, Kos, Xios) and in the Ionian islands (Zakinthos, Kefalinia, Corfu) (Fig. 2) (Agathos, 1975).

There are many local cultivars which are not evaluated yet; these have been selected by the growers for the size and taste of the fruit and for the period of harvesting (early or late cultivars). The fruits of early cultivars are harvested at the beginning of August while the fruits of the late cultivars during November and December. The majority of the existing plants produce fruits with orange-yellow colour while a small proportion produces fruits with red or white colour.

The Barbary fig plants are neither cultivated, irrigated, pruned, fertilised nor sprayed in Greece. In some places in order to delay the harvesting of the fruits, the flowers are removed once they appear in summer; thus the new flowers which appear 2-3 weeks later give the fruits of the late harvest. Due to its xerophitic behaviour, the Barbary fig does not have serious problems with pests and diseases. However in some places, the insect *Ceratitis capitata* can cause great damage to the fruits particularly during the years with mild autumn.

In the Ionian islands, Kefalinia and Corfu, peeled Barbary figs with the name "Frescamento" are sold traditionally in the streets by the people who peel the fruits in the presence of the consumer (Davidis, 1977). Fruits are sold in a similar way in some of the Aegean islands (X. Papanikolaou, pers. comm.). Although the local marketing of the Barbary fig fruits was very restricted some years ago, the quantity of fruits sold during the last years in the fruit shops has increased substantially. In some places a dry paste is made from early maturing Barbary figs which is consumed in winter. According to the local aromatherapy, the extract received after boiling the dried flowers of the plant is used as a diuretic medicine.

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