

THE PISTACHIO INDUSTRY IN ITALY: current situation and perspectives

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Introduction

Pistachio (*Pistacia vera* L.), is a dioecious and deciduous species native to western Asia and Asia Minor. It was introduced into Italy from Syria in 30 A.D. by the Roman Governor of that Province, Lucius Vitellio, at approximately the same time it was introduced in Spain (Minà Palumbo, 1882). Its introduction into Sicily, which nowadays accounts for almost the entire Pistachio industry in Italy, probably occurred some time later, following an initial period of cultivation in Campania which at that time represented the roman "countryside". Its cultivation in Sicily began to spread during the Arab domination (827- 1040 A.D.) together with other major fruit and vegetable species and in parallel with the improvement of the agronomic techniques. As a matter of fact, the Sicilian dialectal term for Pistachio tree (*Fastuca*) is of arab derivation (*Fustuq*). However, very little is known until recent times about its distribution over the region. Historic references onto Pistachio cultivation are documented by the XVIIth century, even if first official records of the economic importance of Pistachio industry are referred to the first decades of the XX century.

Soon after the second world war the entire structure of the Sicilian Pistachio industry underwent to significant modification. The relative importance of the traditional cultivation areas (Agrigento, Caltanissetta and Palermo) strongly decreased with the abandonment of large part of the Pistachio cultivation and was partially compensated by a parallel increase of the production in the Catania Province (Fig. 1).

At the present time more than 90% of the total italian Pistachio area is concentrated in only few territories in the eastern Sicily (western slopes of Mount Etna volcano), mainly located in the districts of Bronte and Adrano (Catania Province), onto approximately 4.500 hectares. Few residuals of the past cultivation can still be found in Caltanissetta and Agrigento Provinces, in small and scattered surfaces (as a whole, 130 Ha in specialized cultivation and 210 Ha in mixed cultivation).

Despite this ancient origin and the long period of cultivation, only few female varieties of Pistachio are now grown in Italy (about ten) together with an even more restricted number of unnamed male selections. Among the female cultivars, 'Bianca' (synonym: Napoletana) is practically the only utilised cultivar, other varieties, namely Femminella, Natalora, Agostana, Silvana, Insolita, Cerasola, Cappuccia, representing no more than 3% of the total (Barone et al., 1985) can still be found, mostly in scattered, abandoned settlements. This genetic pool is probably the result of a two-step introduction of genetic material (Barone et al., 1996) coincident with the earliest introduction from Syria of the reddish 'Cerasola' by the Romans and the later introduction carried out by the Arabs.

The reasons of this low number of varieties is thought to be the exclusive use by the growers of vegetative propagation since ancient times due to the long juvenility period of *P. vera* seedlings, the long life-span of the trees and the hybridizations with other *Pistacia* species. Nevertheless, within the Sicilian Pistachio germplasm, some valuable fruit characteristics such as colour, flavour and nuts quality are highly appreciated in the trade, specially the greenness of the kernels and the rich oily nut-like flavour (Woodroof, 1967). Most of these appreciated characteristics have been maintained also by cultivars obtained in the United States by seeds imported from Sicily in the early 1900's such as 'Bronte' and 'Trabonella' (Joley, 1969).

In spite of these valuable characteristics of the Italian Pistachios, the contribution of Italian production represents nowadays only less than 0.6% of the world production. Nevertheless, with respect to product destination, it has to be said that Italian Pistachios maintain a dominant market position for the uses other than direct consumption (snack), since they are almost entirely utilized, and highly appreciated, by the confectionery and ice cream industry. Due to this fact Italian Pistachio exports, between 1000 and 2000 tons per year (Anonymous, 2000), are represented mainly by shelled and peeled pistachios, whereas imports (about 9000 tons) consist mainly of in-shell pistachios, consumed as salted and roasted snacks for domestic markets and, partially, for re-exportation.

The Bronte area

This area of the eastern Sicilian province of Catania represents nowadays the main Pistachio growing area in Italy. From the ecological point of view this area (Fig. 2) is of great naturalistic importance due to the proximity to the Etna Volcano and the inclusion in the Regional system of parks and naturalistic reserves ("Parco dell'Etna", 59.000 hectares, established in 1987).

Pistachio represents in Bronte one of the main economic resources of the entire territory. A total of 3.300 hectares of specialized Pistachio orchards are located in this area and 1.500 hectares in the neighbourhood territories (Adrano, Biancavilla). The altimetry is comprised between 350 (along the Simeto river bank) and 900 m a.s.l.. The climate is typically Mediterranean with fall and winter precipitations (annual average: ~550 mm). Average monthly temperatures of the area are between a min of 6.0 °C (February) and a max of 32.6 (July) (Fabbri and Valenti, 1998).

Most of these Pistachio orchards are defined as "natural Pistachio plantings" because they have long been obtained by grafting *in situ* spontaneous Terebinth (*Pistacia terebinthus*) plants spread in the particular soils of the area, consisting of rocky, volcanic soils derived in the centuries from the Mount Etna activity, in steep slopes (Barone et al., 1985). This traditional planting system took advantage of the extraordinary characteristics of environmental adaptation of Terebinth to poor, dry, shallow soils of the area, where no valid cultural alternatives are available, except for few other fruit species such as Prickly Pear and Fig. Thus, "natural Pistachio plantings" are characterized by the absence of regular plant spacings and by a wide range of plant density (50-500 trees per Ha). Also the age of the trees is consequently highly variable. Successive interplanting of nursery Terebinth seedlings is a common practice to replace dead plants and to increase orchard density. To this end, few local small nurseries are active in the area of Bronte and supply plant material mainly as seedling

P. terebinthus rootstocks to be grafted directly in the orchard. Small quantities of grafted *P. vera*/*P. terebinthus* pot plants are also produced. In such kind of conditions cultural operations are necessarily carried out by hand, since mechanization is almost impossible also due to the training system adopted that can be defined as an "open vase" with three-four main irregular branches very close to the soil surface. Pollination is ensured by spontaneous male *P. terebinthus* plants or by scattered male *P. vera* pollinizers and also by natural hybrids between the two above mentioned species. Fertilization problems are likely to occur, specially when considering that it largely relies onto spontaneous source of pollen, since male/female ratio generally adopted in the Bronte area is particularly low (1/20).

Besides the natural orchards, new plantations are also present in the area. In this case rational orchard design (6x8 or 8x8) and common cultural practices are adopted.

Napoletana (syn. Bianca) is the only cultivar widely utilized both in the "natural" or in the regular plantations and Terebinth is the only rootstock. Following the descriptors' list for Pistachio (Barone et al., 1997), Bianca tree can be defined of low-intermediate vigour. Growth habit is spreading; branching habit is intermediate. Terminal leaflet length is 10.1 cm, terminal leaflet width is 7.7 cm and the terminal leaflet/width ratio is 1.3. Peak bloom date occurs in the last week of April. Nut size is small to medium; nut length is 21.6 mm, nut width is 11.6 mm, nut thickness is 9.9 mm, nut shape is generally elongated, split nuts is generally low (<25%) and suture opening is narrow. Blank production is about 5%. Average kernel dry weight is 0.48 g, colour is deep green; harvest date occurs between the last week of August and the first week of September (Caruso et al., 1986; 1987; 1993; Spina, 1982).

Old individual trees of other relic cultivars can still be found in scattered areas: "Femminella", "Agostara" and "Natalora". The first one is very similar to Bianca and is now accounting for less than 5% of the total Bronte production; it is characterized by a fruit smaller than Bianca but it was very appreciated for kernel quality. Agostara is the earliest flowering and ripening cultivar in the area. It is considered in danger of extinction. Its fruit is smaller than Bianca's ones. Natalora, the latest ripening cultivar among the local germplasm, is a vigorous and upright cultivar and is considered the worst by the local growers due to the high blank percentage. This characteristic is to be related to the flowering period not coincident with the period of pollen dispersal by the male trees of the area. Its fruit is bigger than Bianca and presents a more irregular shape. Splitting percentage, in any case, is generally low.

As a whole, nut size of Sicilian Pistachio cultivars, including others such as Silvana, Ghiandalora, Cappuccia, Cerasola, Insolia, is medium to small, nut shape is generally elliptic (elongated) and sometimes tends to ovoid. All of them have nuts with an attractive green kernel and similar sizes and weights. Splitting, although variable from year to year, is generally low and, therefore, unsatisfactory for direct commercialization and consumption. Nevertheless, the deep green colour of kernels and their excellent quality are world-wide appreciated (Woodroof, 1967). The overall characteristics of the Italian Pistachio germplasm are, therefore, more suitable for industrial transformation (Barone and Caruso, 1996).

The average Pistachio farm surface in the area of Bronte is of approximately 1-2 hectares, corresponding to a total of about 3000 farms. As a whole, 3000 to 3800 tons of in shell pistachio is the productivity of the Bronte area, corresponding to an average yield of about 1-1.2 tons per hectare. Exceptionally, maximum yield of 4 tons per hectare has been recorded. The average prices paid to growers for in shell product in the last commercial campaigns

ranged between 4 to 5 euro/kilo. During "off" years price tends to be higher (~7.5 euro/kilo). Pistachios are hand harvested with the help of tarps. Fruits are normally hulled with small equipment (Photo 1), with an operating capacity of 400-500 kilos/day, and sold soon after sun drying process (3-4 days) performed directly in the farm. They are bought by about ten local industries that proceed to further transformation. Three kinds of end-products are therefore obtained: in shell, shelled (yield 40-45%) and peeled (Photos 2-3). The prices of the first two categories of products are of about 7 and 15 euro/kilo, respectively. Shelled pistachios are normally commercialized in packages of 25, 12, 1 and 1/2 kilos to domestic and foreign markets. The average operating potential of this kind of processing plant is of about 500 kilos of shelled pistachios per day. Some processing plants further process the fruit to obtain pistachio flour, pesto (condiment), cream and paste for pastry and ice-cream. Like as in other producing Countries, Italian Pistachio industry and market are negatively affected by alternate bearing problem. A particular cultural practice is generally followed by the growers to face the alternate bearing Pistachio habit. It consists, every second year, of the total inflorescence bud removal carried out during harvest time, in the "on" year. This traditional practice is exerted with the aim of obtaining a complete "off" year in order to maximize the yield of the "on" year and to minimize the cultural expenses in the biennium. By this way a biological control of some main pests (bud borer *Acrantus* (= *Chaetoptelius*) *vestitus*, among the others) is obtained by interrupting the natural cycle of the insects. This practice requires about 30 hrs/ha and include also lateral shoots suppression. Other cultural practices carried out by the growers consist of winter pruning (February and March), fertilization (mostly with N and P fertilizers), chemical weed control, orchard floor management (with mechanical hoe) and plant protection. Total cultural requirements in terms of hand labour (including harvest) range between a minimum of 150 to a maximum of 400 hrs/ha. Among the diseases in the area *Cytospora terebinthi*, *Septoria pistaciae* are generally considered the most dangerous ones (Granata et al., 1993). *Megastigmus pistaciae*, together with *Acrantus* (= *Chaetoptelius*) *vestitus*, can be considered the main pests (Greco, 1998). During storage *Plodia interpunctella* attacks to the fruits have to be controlled generally by storage room spraying.

Perspectives

Italy imports annually about 9.000 tons of roasted and salted (or to be salted in Italy) pistachios for direct consumption (snack) (Anonymous, 2000). About one third of this import is from U.S.A. For the snack market, other well-known cultivars from USA (Kerman) and, lastly, also from Australia (Sirora), represent nowadays the market standard. Italy maintains a certain importance for Pistachio production utilized in the confectionery and ice-cream industry as well as for special destination such as for "mortadella" (baloney). The overall structure of Italian Pistachio industry in the years is relatively stable and no particular changes are expected in the near future. Quality of Sicilian pistachios is undoubtedly of high value, but other Mediterranean Countries, with similar varieties and lower production costs, are rapidly becoming potential strong competitors. Even if, under the point of view of environmental suitability, there will be no obstacle to a further diffusion of the culture in other areas of the Country without the natural limits characteristic of the Bronte area, very few new plantations have been established in the recent years. The major constraints are, perhaps, the long unproductive period of the culture (full production is normally reached by the 12th or 13th year), together with the lack of sufficient experimentation on new orchard design, alternative

rootstocks, mechanization and availability of less alternate bearing cultivars. The question that arises is also related to the aim of new plantations: whether for industrial transformation, following the present specialization, or for direct consumption, as in rest of the emerging producer Countries. In the first case we have genetic material, market opportunities and know-how enough to imagine an easy development. In the second case, other varieties should be tested for the Sicilian environmental conditions, together with cultural techniques best suited. For this last option, strong concurrence, especially for the cost of production, has to be faced. In both cases there is a strong need for research. At the *Dipartimento di Colture Arboree* of the *Università di Palermo* researches on alternate bearing phenomenon, rootstocks and germplasm evaluation are underway, in some cases from the 80's. Some results of this research activities have been recently presented to the last GREMPA meeting held in Mirandela, Portugal (Barone et al., 2003; Caruso et al., 2003).

Although current Pistachio industry condition, as before mentioned, could be considered stable, great opportunities are expected from the diffusion of mechanization, specially for harvest and other cultural practices. This condition is more likely to be actuated in areas of new plantations where there are not the environmental constraints of the Bronte area. For this last area a strong impulse is expected by the obtainment of the trade mark DOP (protected origin denomination) for the pistachios of Bronte, acknowledgement that is underway. Finally, even if co-operation has recently become stronger than in the past, a further development of co-operation and, possibly, the establishment of an unique Pistachio association among the growers are highly advisable to promote the Italian Pistachio industry, as already done in other producer Countries.

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Fig. 1 - Pistachio production in Italy

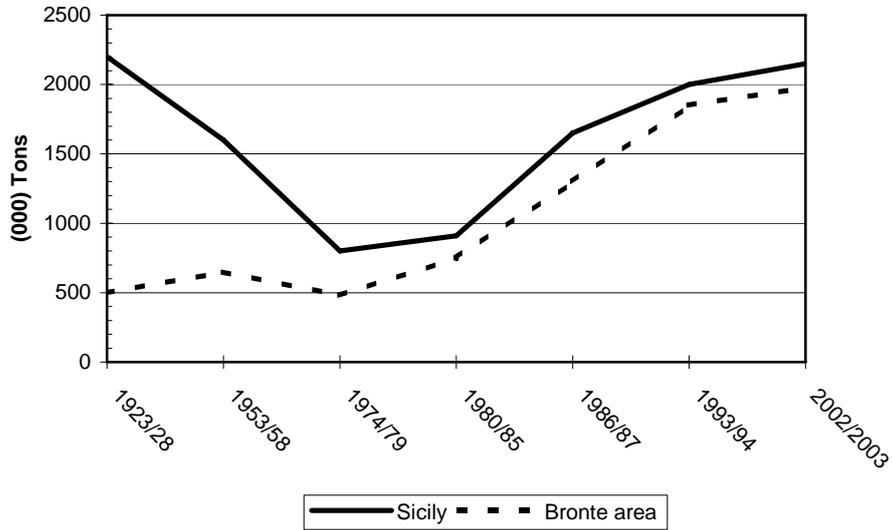


Fig. 2 - The "Parco dell'Etna" area. The Bronte Pistachio area in the circle.

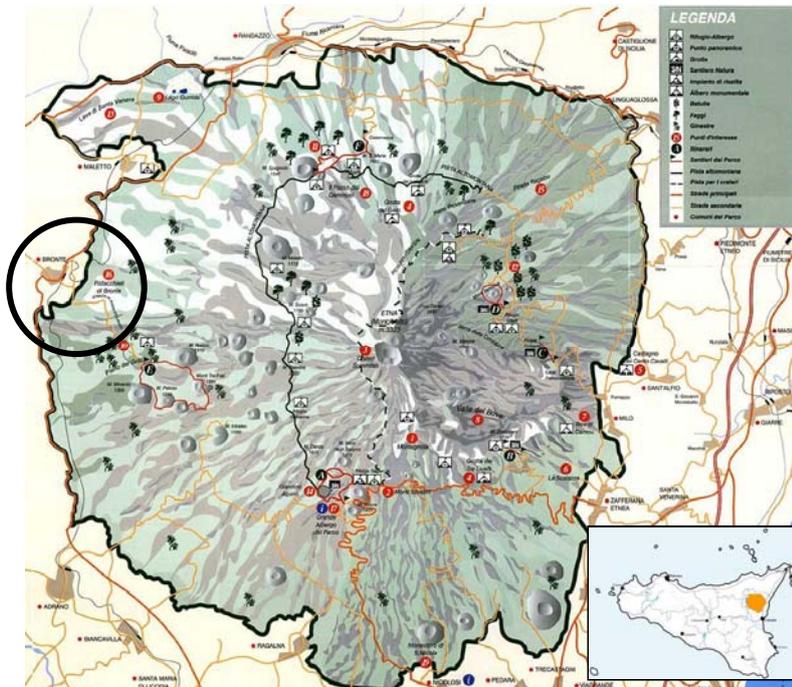


Photo 1. - Electrical hulling machine



Photo 2. - Cultivar Bianca Pistachios kernels



Photo 3. - Cultivar Bianca Peeled Pistachios.



Photo 4. - Pistachio shelling machine.

