

Economic Aspects of Italian Cactus Pear Production and Market*

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ABSTRACT

This study examines the main economic aspects of cactus pear production in Italy. In particular, following a brief introduction which places the work in the wider context of global trends for cactus pear production, the study presents a in depth analysis of demand trends and its determinants, supply and its utilisation, sales and marketing processes and price trends at the farm gate and wholesale levels. Overall, the recent expansion in production, in the face of a slight reduction in profitability, confirms the strength of this product in the market. This is despite the poor structure of marketing and trading institutions, and the lack of serious promotion efforts. In this context there appears to be a significant role for public intervention.

INTRODUCTION

The cactus pear's ability to adapt to different pedoclimatic environments has allowed the plant to be cultivated in many continents (Europe, America, Asia, and Africa), even though, in the countries where it is most diffuse, the limits of statistics collection do not permit a sufficiently wide statistical sample (Barbera, Inglese, and Pimienta-Barrios, 1995). The scarce information and, in some cases, the fruit's relatively slight importance prevent important international organisations (EU, FAO, OECD, World Bank, etc.) from supplying enough economic data about world cactus pear production (areas, production, employment, gross sales, export figures, etc.).

The main producing country at the world level is Mexico, with a production of over 300,000 tonnes on almost 70,000 hectares of specialised terrain, concentrated mainly in the central-northern and central-southern areas (Pimienta-Barrios, 1990; Flores-Valdez et al., 1995).

Next is Italy with about 3000 hectares of intensive cultivation and a production of over 70,000 tonnes, mostly concentrated (90%) in Sicily.

South Africa's 1,500 hectares give a production of about 15,000 tonnes while Chile's specialised area is about 1,100 and gives a production of over 8,000 tonnes.

Smaller areas are to be found in Argentina (800 hectares) and the USA (200 hectares, of which more than half is in California). In these latter two countries the production is modest (7,500 and 4,000 tonnes, respectively).

Among the other countries where we find cactus pears there is Brazil, Peru, Colombia, Jordan, Egypt, Tunisia, Algeria, Morocco, Turkey, Spain, and Greece.

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ECONOMIC ASPECTS OF ITALIAN CACTUS-PEAR PRODUCTION

Several studies of the economics of cactus pear production and markets in Italy have been carried out during the Nineties using *ad hoc* methodologies. These studies have analysed the economic characteristics, peculiarities and results in this specific field and have contributed to enrich the limited number of available economic-business analyses for this type of cultivation, as well as providing a preliminary analysis of the Italian cactus-pear production market (Basile, 1989, 1990, 1991, 1993, 1996, 1997; Crescimanno et al., 1995).

Most of the areas given over to cactus pear and the corresponding production obtained are to be found in Sicily, as indicated by the data provided by the Central Statistics Institute (ISTAT). Even though there are differences as regards the cultivation's degree of Sicilianisation, registered evolutions and the diffusion of the cactus's presence in the nine regional provinces of Sicily, it has been possible to evaluate and interpret these differences.

The island's surface areas under intensive cactus pear cultivation have expanded remarkably even in the last few years, to such an extent that at 31 December 1998 these areas measured about 3,000 hectares; those under traditional cultivation, on the other hand, are in decline, having gone from 25,000 hectares to 20,000 hectares between 1989 and 1998, a fall of more than 20%.

Most of the areas under intensive cultivation (about 80%) are to be found in the three major production zones: the San Cono Hills, the Southwest Etna area, and the Belice Valley, and in all these areas there was an increase in specialised installations. On the one hand, this confirms the growing interest shown towards this cactacea, but on the other hand, if recent trends continue in future years, operators in this sector and public policy would necessarily have to face the problem of the cultivated areas' so-called "vocationality" and of the demand's capacity to absorb the ever growing quantities produced.

As regards harvested production, it was found that in a five-year period there was a progressive increase in Sicily of the corresponding average quantities, going from the 35,000 tonnes in 1975-78 to the 55,000 tonnes in 1991-94 and to the 63,000 tonnes in 1997-99. Should this positive trend continued in the future, by 2002 we would reach over 65,000 tonnes of production, mostly polarised toward the three areas dealt with in this analysis.

Modern, specialised intensive cactus-pear cultivation is ever more popular than the traditional, extensive kind. In particular, the former is characterised by the use of technical-labour schemes, organisational methods, and business management not dissimilar from those of other fruit tree cultivations. The economic performance remains satisfactory and justifies the recent expansion in areas, although profitability in real terms has been reduced somewhat in recent years.

Some features and peculiarities differentiate the three zones in the survey with regards to the plantation structure, the modest economic dimensions of the businesses (particularly in the Belice Valley zone), the different levels of predominance of cultivating businesses, the different ways of growing cactus pears and managing the businesses, etc. As regards this last point, the differences are, at times, very marked, with reference to, for example: a) the cultivation regime (the dry type is more common in the Belice Valley); b) the degree of mechanisation of the growing operations (in relation to the length and regularity of the plant layout) with the Southwest Etna zone in the worst condition; c) the use and ways of carrying out some "typical" operations (like pruning, "scozzolatura", and thinning out of the fruit), mostly present and more carefully performed in the San Cono Hills zone; d) the fertilisation programmes, in respect of which it will soon be necessary to evaluate the impact of the recent agro-environmental measures put forward by the EU (EEC Regulation 2078/92 and later ones).

It is obvious that the differences observed in cultivation techniques influence both costs and revenues arising from a cactus-pear plot, as well as the relevant profits. From territorial surveys, a distinct predominance of “yellow” cultivars emerged over that of the “red” and “white” ones, as well as a higher production of “bastardoni” fruit over the “August” ones. What is more, there are very few associative market enterprises, and a conspicuously insufficient number of commercial structures. However, de-prickling techniques are being perfected and the appropriate machinery is being distributed among the commercial operators, above all in the San Cono Hills zone and in the Etna area (province of Catania). There are three types of sales: ex farm “a strasatto”¹, ex farm by weight and ex market. The first, which implies the buyer is paying for the harvesting of the product, continues to be the most widespread type.

Within the technical-economic analysis of the cactus-pear industry (Basile, 1996), conspicuous degrees of activity emerge which can be linked to the fact that many of the operations involved must necessarily be carried out by hand as they cannot be mechanised. The labour costs, which do not include harvesting and the successive operations, (inasmuch as the product’s degree of technical-economic preparation, in which the agricultural phase finishes, normally refers to the fruit hanging on the plant), are, on average, higher in the San Cono Hills and in the Southwest Etna zones than in the Belice Valley and range between a minimum of 130 hours per hectare and a maximum of 338 hours, of which over 70% are referable to those growing operations characteristic of this cactacea.

The land investments average values are highest in the San Cono Hills (over US\$8,000 per hectare)² and in the Southwest Etna (almost US\$6,500 per hectare), and are just above US\$5,000 in the Belice Valley. These investments are made up of many different types and subtypes of works, among which the most predominant are the cactus-pear plot and installation costs that make up between 66% and 85% of the totals.

The absence or presence of rural farm buildings, of irrigation or water distribution systems and the execution of works before the setting up of the cactus pear cultivation bring a strong variation to land investments in the different businesses. This variability is instead more contained for reserve investments, which are on average higher in the Belice Valley (about 1,200 US\$ per hectare) than in the San Cono Hills (US\$750) and in the Southwest Etna (US\$650).

As regards the economic results of the cactus pear businesses, they can be largely explained as follows (Table 1). The components of the production costs which weigh most heavily in the areas under survey are labour and services (almost 50%), followed by the shares and other attributions, and lastly by materials. The average values on the businesses under survey are about US\$3,100 per hectare in the San Cono Hills and in the Southwest Etna zones and US\$2,750 per hectare in the Belice Valley zone, with appreciable fluctuations both in the first zone (from US\$2,200 to US\$4,150) and in the second (from US\$2,250 to US\$3,750) and, above all, in the third (from US\$1,900 to US\$3,900).

In general terms, the gross production for sales appear to be higher on average in the San Cono Hills (US\$4,550 per hectare) with respect to the Southwest Etna (US\$4,350) and to the Belice Valley (US\$3,500); these differences can be attributed mainly to the different yields. A certain variability can be observed, however, in the gross saleable production, to a greater extent in the first and third zones and to a lesser extent in the second.

Profits are positive in all the businesses examined (45), but there are interesting differences in average values (about US\$1,500 per hectare in the San Cono Hills, US\$1,250 in the Southwest Etna and US\$700

¹ “a strasatto” means the harvest is bought as a lump sum with no precise definition of the quantity of product.

² US\$8,000 is equivalent to about 16 million lire; the exchange rate used in this paper is US\$1 = 2,000 It. Lire.

in the Belice Valley); however, actual values are characterised by high variability within each zone, above all in Southwest Etna.

It must be noted, in fact, that in correspondence to the increase in yields, there has been a progressive reduction in production prices, which, while remaining at acceptable levels, have shown a descending trend in real terms, and are such as not to allow the registered reductions in production costs, again in real terms, be compensated.

Table 1. Average Costs, Gross Sales, and Profits in the Three Main Production Areas in Sicily (US\$ per hectare)

Production Area	San Cono Hills	Southwest Etna	Belice Valley
Costs	3100	3100	2750
Gross production for sales	4550	4350	3500
Profits	1500	1250	700

From the analyses carried out on the cactus pear market, the indications of the demand (domestic and foreign) seem to show that further supplies of the product could be absorbed. The large number of commercial operators present and the poor concentration of supply, together with the poor commercial distribution and marketing of the product, considerably hold back its market potential. This cactacea, if properly promoted and distributed, could earn new consumers both in Italy and abroad. If, on the other hand, there will be further price drops in the future, also due to an increase in the product's supply, this could not but have an adverse effect on the production (GSP), on earnings, and profits of cactus pear cultivation, and this would block any expansion process under way.

Thus, intervention from the public sector becomes of fundamental importance in order to offer prospects of consolidation and development for this cultivation. In fact, public policy has been noticeable in its absence despite serious initiatives taken at an international level and a definite compatibility of cactus pear growing, which typically has a very low environmental impact, with the new Community Agricultural Policy (CAP) and its orientation towards eco-compatible production. The future of this productive sector is, however, linked to many things: scientific and technical progress (especially in the mechanisation of "typical" agricultural operations, in solving the problems with the prickles,³ in reducing the amount of seeds in the fruit, and in experimenting with new varieties); to the strengthening of commercial structures; to an improved and qualified technical back up; and to deeper and more efficient promotional and advertising strategies.

In as much as cactus pear growers know they have to insist on the quality of their product and be prompter in responding to consumer demands (for example in relation to the diversification of varieties, product packaging, the commercialisation calendar), they will have a greater possibility of maintaining or even perhaps improving the favourable situation which has been at the base of cactus pear development as from the second half of the Seventies, by exploiting to the full those strong points of the cultivation which are, as already said, the low environmental impact of the cultivation, as well as being a true subtropical

³ Prickles is a term widely used by agricultural economists working with prickly pears and refers to spines or glochids.

fruit (which has only partially been exploited), and which ripens in a period of the year (September-December) characterised in the northern hemisphere countries by a very modest availability of fresh fruit.

ANALYSIS OF DEMAND

Cactus pear demand is concentrated in Italy almost exclusively in the second half of the year, which corresponds to the ripening and commercialisation of the fruit in Sicily and in the other producing regions. The reduced quantities consumed in the months of March, April and May regard fruits imported from the Austral hemisphere (Mexico, Chile, Brazil, Colombia, etc.) and those fringe consumers who continually seek early or late fruits.

It is necessary to distinguish between the demand for the “August” product and/or that belonging to a medium-low commercial category (second and third) from that which aims at extra or prime quality “scozzolato” products. The former demand generally comes from habitual, low-spending-capacity consumers of cactus pears (in the production zones themselves and in those areas of northern Italy where there are high concentrations of southern and Sicilian emigrants, religious communities, the armed forces, etc.), a demand which seems to have remained constant in the last few years. The second type of demand is that which comes from medium-high spending capacity consumers, who associate the cactus pear with exotic fruit and who appreciate the organoleptic characteristics of a product which is very close to being an organic one in that the chemical techniques used in its cultivation are minimum. In the final years of the millennium, production of the latter has been growing.

As there have not been large price oscillations for cactus pears, it is not possible to measure the demand elasticity with respect to price, but the calculations carried out seem to indicate that the elasticity is for the demand of the first type, while it is higher for quality categories of “scozzolato” fruit.

It can be stated that the cactus pear demand is relatively inelastic in respect of the real earnings of consumers belonging to lower social bands. However, it also appears that in recent years consumption has increased, especially by well-off consumers, as a result of increased marketing and promotion activities of this cactus fruit.

The product is mostly consumed in Sicily and in other regions of the South of Italy, but notable levels of consumption are also present in the main Italian cities (Milan, Turin, Rome, etc.).

The cactus pear is not very well known on the consumer markets, and this undoubtedly represents a serious limitation to demand. Many consumers, who have had the opportunity to taste and appreciate the product, have difficulty in finding it in normal shops; this is mainly attributable to problems in commercial distribution which characterise the national market.

As far as factors which influence demand, the main ones are the presence of prickles (even though ever growing quantities of the product sold today undergo a de-prickling process, which reduces the number but do not eliminate the problem); the variety (“yellow”, “red” or “white”); the high number of seeds; the sizing of the fruit; the degree of maturity and the relative typology (August or bastardone); and the packaging. The positive evolution of cactus pear demand is to be associated to the fact that this product exemplifies the Mediterranean diet and produces, thanks to its sugar and amino-acid content, positive effects in the treatment of kidney functions, in that it stimulates both diuresis and intestinal peristalsis.

Cactus pear demand abroad has definitely grown both in Europe and elsewhere, even though no precise official statistical information is available; but the trend is supported by the various producing countries’ increasing exports. Differences in the commercial ripening seasons and improvements in distribution,

together with other circumstances, have contributed to this product being consumed in many countries in the world, for many months of the year.

A good international advertising-promotion campaign for the product, which is still little known, would help raise cactus pear demand, with probable price rises too which would stimulate the expansion of producer country installations including Italy.

As regards the per capita consumption of cactus pears, according to our estimates, it is presently at about 2.5 kg in Sicily and fluctuates between a few hundred grams and a maximum of 1 kg for the inhabitants of the other regions of Italy.

Although present, there is a minimal demand for cactus pear derivative products (jams, “mostarda”⁴, ice cream, liqueurs, etc.) and mostly concentrated in Sicily, within the producing families themselves and those of the workers involved in the cultivation of the plant in production units. This gives rise to a phenomenon of self-production for personal consumption of these products, which also extends to confectionery craftsmanship. It should be noted, however, that in recent months the sale of these products on the Internet has been growing; e-commerce is becoming very important everywhere and this form of sale allows the chronic limitations of the product’s distribution to be reduced and constitutes a valid promotion and sales vehicle all over the world. It will be interesting to see – in the immediate future – whether and to what extent our commercial operators will make good use of this instrument of enormous potentiality.

ANALYSIS OF SUPPLY AND BALANCE OF UTILISATION

Total production of cactus pears in Sicily has been increasing steadily since the early 1980s. These results were reached on the basis of the ascertained evolution of the growing areas (young installations which have come into production, drops in yields of installations with declining production, new production areas, innovations in cultivating techniques, etc.).

The traditional fragmentation of businesses made it particularly difficult to quantify production. It was, however, possible by exploiting to the full the results of surveys carried out over several years, results which are particularly reliable.

The incidence of harvested production on total production is 85% to 90%, with fluctuations from year to year in correlation with particular meteorological conditions and the presence of pathogenic agents or, to a lesser degree, to negative outcomes linked to the introduction of particular growing techniques.

The so-called “August” or “first-flowering” product, that is the one not “scozzolato”, is much more common in the secondary traditional plantations, while it only makes up 5% to 10% of intensive cactus pear cultivation. This can be explained by the fact that as they do not reach medium to large size nor satisfactory levels of quality, consumers prefer them less, although their early arrival is appreciated.

With reference to all the zones examined, the production harvested by cultivar gives constant data over time; the “yellow”, the “red” and the “white” varieties make up respectively 80%, 15% and 5% of the total harvest.

As regards harvesting calendars, 60% to 70% of production reaches commercial maturity in the maximum harvesting period (from the end of September to the beginning of November), while the rest is equally

⁴ “mostarda” is a typical kind of confectionery made from either cactus pears or other fruits, such as grapes.

split between the initial period (starting at the beginning of August) and the final one (which goes up to the end of the year).

The product's quantitative and qualitative variability from one year to another is determined mainly by factors linked to – besides those linked to atmospheric and climatic events (floods, frosts, extreme temperature changes, relative humidity levels, etc.) – cultivation techniques (the quality and quantity of fertilisers used; quantity and type of water used for irrigation; variety, forms, and times of some cultivation operations employed, etc.) and to some producers' choice to concentrate on lengthening the periods of supply over the year.

The unit yields are higher in the San Cono Hills zone than in the other ones, in the irrigated plantations than in dry ones, and in specialised plantations compared to mixed ones.

As regards the various different commercial categories, about three-fourths of production is represented by "prime" (mainly) and "secondary" quality; the "extra" category is about 10% to 15%, while the rest is represented by "super-extra" and "third" quality. The current trend is toward quality production, which is achieved by concentrating on some specific cultivation operations, on irrigation and on fertilisers which give an ever-higher relative weight of production with ever-larger fruit in respect of total production.

It is obvious that the limited availability of buildings usable for stocking this product conditions the cactus pear producers' strategies of harvesting and sale of the product.

Generally, two or three harvests are made and only rarely (above all, in the Belice Valley) is a fourth harvest obtained. Any differences are strictly linked to the forms of sale of the product and the possibility of collocating it at the end of the season, even though it commands higher prices then.

In the three zones under survey, there are very few buildings with specialised refrigerating facilities. There are, however, brick buildings or airy pre-fabricated buildings which allow the product to be stored for up to fifteen days from harvest, that is for the time necessary to transfer it elsewhere for it to be processed and packed, or put directly onto the market. Both commercial operators and the few cooperative societies present use storage for about 10% of the harvested fruit. In the face of the advantages gained from spreading out the product's collocation on the market, there are, however, notable disadvantages directly linked to the length of time taken: product weight loss, quality drop, risks linked to the development of fungal diseases, etc., as opposed to what refrigerating facilities could offer, using *ad hoc* techniques.

As to the product's organoleptic characteristics, the "yellow" is generally superior to the "white" and "red", in terms of sugar content and taste. The "white", however, takes on superior characteristics to the "red" and "yellow", even though it does not travel or store well. The "red" produces larger fruit and so its weight in the "super-extra" and "extra" categories is relatively high compared to the other two cultivars.

Resistance to storage depends on the production zone, the degree of ripeness and forms of harvesting. In terms of resistance on the plant, resistance to handling, resistance to storage and resistance to transportation it is again the "yellow" which prevails over the "white" and "red". The latter two cultivars are nonetheless grown in order to obtain a pleasing chromatic effect in the crates made up for commercial distribution, which the consumer seems to appreciate.

It must be initially underlined that the figure for unharvested fruit has been estimated at 10%, so that the evaluations have concerned the use of the average quantity of cactus pears produced and harvested on a national level.

On the basis of the balance of utilisation of cactus pear production in Italy (Table 2), the main destinations for the product seem to be national wholesale fruit markets, where about 28,500 tonnes end up, 45.2% of total, followed by the so-called “outside the market” (20.6%) and by the foreign markets (19.1%), by the farm rejects and unsold stock, by weight losses and wastage (9.5%) and, last, by personal consumption (5.6%). The product’s industrial transformation, which in other countries has a certain importance, was deliberately left out due to the limited position it still occupies today, as it is strictly at a local level and linked to the field of confectionery and/or family use, included in the item “personal consumption”.

In effect, the surveys carried out at the wholesale fruit and vegetable markets, despite all efforts to the contrary, gave poor results. To make up for the “reticence”, for the disorganisation, for the lack of data about cactus pears transported in mixed consignments (within which most of the goods were citrus fruits, grapes and some vegetables), estimates were made taking into consideration the ten principal Italian fruit and vegetable markets (Milan, Turin, Verona, Bologna, Fondi, Naples, Bari, Palermo, and Catania) which together take up 80% of the relative total (22,800 tonnes).

Table 2. Balance of Utilisation of Cactus Pear’s Production in Italy (1996 - 1999) (*)

Indications	Average quantities	
	t	%
Personal consumption	3,500	5.6
Wholesale fruit and vegetable markets	28,500	45.2
Outside the market (street vendors, Large Retail Distribution, etc.)	13,000	20.6
Foreign markets	12,000	19.1
Farm rejects, unsold stock, weight losses and wastage	6,000	9.5
Total	63,000	100.0
(*) Our calculations made on valuations and estimates based on direct surveys, referring exclusively to harvested production		

It is to be noted, moreover, that it was possible to ascertain that almost all the markets listed above are to be found in areas which do not absorb the whole quantity passing through the same market. It was, in fact, found that a part of the goods are successively distributed in other areas of the same region or even in other regions quite far away.

The so-called “outside the market” category is on the increase and is made up first of street vendors, particularly widespread in the Southwest Etna zone, in the Belice Valley and the province of Messina (Table 2). It is often the producers themselves (in particular the owners of smallholdings) who become street vendors in order to sell their products at notably higher prices; but all this is possible only in those cities near production zones, like Palermo or Catania. In the other cases, we see small commercial operators serving consumer markets which are not covered by the wholesale fruit and vegetable markets, sometimes as far away as Calabria.

In the “outside the market” category there is also the large-scale distribution chains, which often and ever more frequently turn directly to the producers who are best organised at working with the product or to commercial enterprises. They sign contracts which include particular forms of packaging and guarantees of consistency in supplies, besides a high level of product standardisation.

Again, in this category we included centres of mass catering (army canteens, hospitals, religious communities, university and large company canteens, schools' hotel complexes and tourist villages, etc.), that find it more convenient to buy direct from producers in the period (autumn) when other fresh fruit is in short supply.

Still only modest quantities of cactus pears are today absorbed, as already said, by the confectionery, pharmaceutical, and cosmetic industries, although there seems to be definite growth potential: for example, "mostarda" (see note n.3), ice cream and liqueurs – and probably soon, since applied science is showing significant progress – shampoos and an anti-wrinkle cream (as has already happened in Mexico).

About 12,000 tonnes of produce go onto the foreign markets, 19.1% of the total; most of the product goes through foreign wholesale, and only a modest quantity goes directly from Italy to some important commercial operators and emigrant communities (Table 2). The foreign markets towards which most of the product is destined are the European ones (above all France and Belgium and, to a lesser extent, Germany, the United Kingdom and Switzerland), the United States, and Canada.

Farm rejects, unsold stock, weight and individual fruit losses and wastage were estimated at 6,000 tonnes. These are all things which happen to goods during its processing, transport and storage until it is put onto the market (Table 2).

Finally, a very minor percentage (5.6%) is personally consumed by the cactus pear growers themselves and their families, and also by those who work in the businesses, although this is a particularly small quantity (Table 2). In those cases where production is sold "a strasatto" or "ex farm by weight", it is quite common for producers to keep the harvest of some particular carefully chosen plants for themselves. The number varies according to the size of the farm and the agreements made.

Were a balance of utilisation for Sicilian consumption and exports to the rest of Italy and abroad to be considered, it would be discovered that more than one-fourth of the product remains in Sicily, 20% goes to foreign consumers, and more than half is consumed in the other Italian regions. On the island itself there is widespread consumption in all nine provinces, with higher levels – obviously – in the main producing zones. In the rest of Italy consumption is most widespread in the Southern regions, in the cities where the main fruit and vegetable markets are and, in the North, where there are residents of Sicilian origin and emigrants from producing countries (in particular north African), as well as pockets of high spending-power consumers who equate the cactus pear with exotic fruit and consume the highest quality categories at higher prices.

PRODUCTS SALES AT FARM GATE AND TYPES OF AGENTS TRADING CACTUS PEARS IN ITALY

In the main production zones the most common form of sale of cactus pears is that of ex farm "a strasatto", unlike other sectors. This form of sale concerns about 80% of production and implies that the buyer pays for harvesting. In some cases the product is sold ex farm "by weight", almost exclusively with harvesting being paid for by the producer. Although present, it is much less usual to find the product sold "ex market", with the producer paying for harvesting, processing of the product, and transport to the place of sale.

In an "a strasatto" sale, the contract is verbally defined 2 to 3 months, or more, before harvesting and stipulates that the buyer pays from 30% to 50% of the agreed sum in advance, while the remainder is payable towards the beginning of the harvest. To reach a determination of the value of the goods on sale,

the parts estimate the quantity of goods to be produced that year, taking into consideration the age of the plantation, the layout of the installation, the cultivation processes involved (especially the “scozzolatura”), the cultivation’s regime, etc. Having agreed on the production volume, the parts establish the sale price to be applied in order to obtain the value of the goods in question. It must be emphasised that the buyer in turn then organises the harvest of the product, spreading it out over time according to his own processing and storage capacities, as well as market trends. The relative production risks (atmospheric, climatic events, etc.) are transferred from the producer to the buyer at the moment of stipulating the contract. The first commercial contacts are normally made at the beginning of spring, although in particularly abundant years, they can be brought forward to the first few months of the year. The buyer usually transfers the product to his own premises directly after harvesting, so that processing and packaging of the goods can be completed as quickly as possible.

Sale ex farm “by weight” gives rise to the same conditions that regulate the sale “a strasatto” as regards the nature and form of contract, advance payments and forms of payment. The producer agrees with the other party the number of harvests to be made and sometimes also other aspects of forms and times of harvesting, with the general aim of allowing the buyer to find the best placing on the market for the product. There are wide price fluctuations in sales “by weight”, taking into consideration the categories of product obtainable from the installation, the care taken by the producer and the varieties present on the farm. The risks linked to quality-quantity aspects of the production remain, however, with the producer until the goods are delivered. An ever growing number of cactus pear producers prefer to sell “a strasatto”, above all because of the minimal difference in price between the two forms, and because of the reduced risks and time savings, particularly in relation to harvesting and putting the goods onto the market.

A few producers, instead, choose to sell their produce ex market, taking upon themselves all the operations to do with production, harvesting, processing, packaging and at times even storing of the cactus pears. This form is preferred by medium-large producers who find it easy to get the necessary workforce for the various different phases of processing, producers who have space, equipment, means of transport and enough financial resources to be able to put the goods onto the market themselves.

As regards the destination of the product, there are numerous alternatives. Some producers directly export their produce, others take it to either Sicilian or national wholesale fruit and vegetable markets, others again directly supply the large distribution chains and mass catering, and others, lastly, place their packaged crates with large commercial operators.

This latter form of sale is in effect potentially the most remunerative, as long as the producer is prepared to undertake higher risks and has a higher than average organising and management capacity, besides having correct and timely information about price trends in Italy and abroad.

On the Sicilian cactus pear market, various types of operators are present, some of whom work for third parties (mediators, buying agents, selling agents, forwarders, etc.), others of whom work for themselves (harvesters, wholesalers, retailers), and others again who have a mixed role (for example forwarder-selling agents, mediator-harvesters, etc.).

As regards the distribution circuits of cactus pears in Italy, the primary figure present is the producer-dealer. In some cases, in fact, the producer harvests the fruit and consigns it directly to the retailer, thus by-passing several commercial phases. The product then goes directly to the final consumer if the retailer is a street vendor. This kind of figure can, however, also entrust the sale of the product to a selling agent, who in turn deals with placing the product with retailers. Among the producer-dealers there are both medium-large enterprises, equipped for processing the product on their own premises, and smaller enterprises which produce smaller quantities of cactus pears which go to selling agents or retailers.

There have been cases of producer-dealers who export the product directly abroad, transporting it in lorries and/or ships for European destinations, or in containers, or indeed by air toward other continents. The most frequent distribution circuit is, however, the one centring on the figure of the wholesaler who buys the goods from the producer and sells them to the retailer (relying or not on a selling agent), who then places it with the final consumer. Thus we have the two main articulations of distribution:

producer → wholesaler → retailer → consumer

producer → wholesaler → selling agent → retailer → consumer.

In respect of these two distribution circuits, it is possible to set up two others, which both entail the presence of an intermediary (a mediator or buying agent):

producer → intermediary → wholesaler → selling agent → retailer → consumer

producer → intermediary → wholesaler → retailer → consumer.

The four distribution circuits listed above, which involve wholesalers, are, in effect, widely present in all three main production zones, and it can be reliably stated that over two-thirds of production is channelled by these means into commercial distribution.

The latter three possible variants of distribution circuits imply the presence of an associative enterprise, which, in reality, in those years considered in the survey was present in very few cases, the most important of which are: the “Gattopardo” co-operative in Santa Maria Belice and AFISA, located in the San Cono Hills. The associative enterprises of producers transfer the product either to wholesalers or to selling agents; from these two channels the cactus pears reach the consumers by way of retailers. So the two distribution circuits within which associative enterprises are present can be laid out as follows:

producer → associative enterprise → wholesaler → retailer → consumer

producer → associative enterprise → selling agent → retailer → consumer.

Going on to analyse the individual figures of operators present in the cactus pear market in Sicily, as regards the mediator it must be said that this figure is present in the main production zones and in most selling operations. Their charge usually fluctuates between 2% and 5% of the gross saleable production, is normally paid by both parties and varies according to the differing local habits, to the operator’s degree of professional quality, to the financial weight of the contract and to the size of the company. The mediator helps to set the final price and is usually paid for his work when the contract is defined.

The buying agent is a less common figure than the mediator, who deals with buying the product for other commercial operators with whom he has a trust relationship and from whom he receives a forfeit payment (thus not linked to the value of the contract), of about 5%, which the producer pays him.

As concerns the legal form of the commercial enterprises, there are very few individual firms and the number of partnerships is also low (there have been some cases of limited liability partnerships), while there are a lot of co-operative societies and above all societies in collective names.

In almost all cases the company’s registered office corresponds with the processing warehouse, and these are located in the main production areas or in some commercial agricultural centres (Paternò, Palermo,

Giarre, etc.). Some large companies have their central offices in important cities in the South of Italy like Salerno for example.

The commercial enterprise which buys the product “a strasatto” takes upon itself the cost of operations of harvesting, of then transporting the goods to the warehouse usually with its own vehicles, and then of processing, selecting, de-prickling, sizing and packaging the product. The goods are, therefore, transferred onto the market either on their own behalf or that of a third party, or sometimes to the large distribution chains or to other commercial operators.

The warehouses inside which the product is processed are generally *ad hoc* built premises, even though in some cases pre-existing buildings have been restructured to adapt them to cactus pear processing. The overall surface of the warehouses extends further than that of the buildings in that often areas are equipped for processing but not indoors. Most of the warehouses are very near road systems, even though they are not always near other transport links (railways, ports, etc.).

For the product’s processing, warehouses are equipped with fruit de-prickling, selection, and sizing belts, whose costs range from 20 to 40 million lire (about US\$10,000 to US\$20,000) and beyond. Increasingly, machines are being purchased with efficient brushes capable of removing 90% of the product’s prickles and of sizing it into 6 or 7 different commercial categories (“16”, “18”, “20”, “24”, “30” and beyond) in relation to the number of fruits in a crate. Selection, which entails eliminating fruit damaged by flies, transport, or split by frosts and/or hail storms, or because it is too small, is carried out by specialised staff who also ensure the perfect working order of the machines.

The product is packaged in plastic, wooden, or cardboard containers of various shapes and sizes (mostly 30 X 40 cm or 30 X 50 cm) and with a capacity of between 3 and 5 kilograms.

Until a few years ago, the wooden crate was the most common, while recently the plastic one has been developed and, above all, the cardboard one. According to its specific destination, the product can be packed in special 1-kg plastic or polystyrene trays or in small 1.5- to 2 kg-wooden cases (for sale in supermarkets, large food stores, etc.).

Once packaged, the product is stored in airy rooms inside the warehouses themselves or in outside buildings or in refrigerated cells or in controlled-atmosphere conditions, when they are available to the firm.

The busiest period is the second half of the year, above all the months of September, October and November, during which work is carried out every day on the whole amount which comes into the warehouse; for this, semi-fixed (seasonal) workers are employed and others, when needed, on a daily or weekly basis according to the working capacity of the equipment (at full speed, 15 to 20 quintals per hour) and to the work loads.

Those products which are transported by road are piled on pallets on wooden stands for an overall load of 700 kg of cactus pears (260 crates of 30 x 40 cm). This load sits for a few hours or, at most, a few days before being transported to the markets; this is why there is no warehouse stock or processed stock.

It must be emphasised here that the exclusive transportation of cactus pears is much less common than mixed loads, that the period of highest commercialisation falls in October and November, and, finally, that among the forms of sale of “packed” goods, selling directly in the warehouse prevails over selling through a selling agent and through large distribution chains. At a purely indicative level, a determination of the average cost of commercialisation was reached referring to the principal forms of sale, processing, transport and collocation on consumer markets. The commercial enterprise which buys ex farm

“a strasatto” has to pay for some agricultural operations, the harvesting, the transport of the product to the warehouse, the processing itself, packaging, making up the pallets and transport to the markets and also for the consequent commission charges. These costs together lead to an estimate of US\$0.35 to US\$0.40 (700 to 800 lire) per kilogram in the San Cono Hills and in the Belice Valley and of US\$0.40 to US\$0.45 (800 to 900 lire) in the Southwest Etna zone where the uneven terrain makes farm operations more costly, including the commercialisation of cactus pears.

Finally, it must be said that the single commercial enterprises limit their marketing actions to ill-frequent illustrated pamphlets on the characteristics of the product and on how to consume the product itself. The Regional Agricultural and Forestry Council have, instead, activated a promotion-advertising campaign over several years with free tasting sessions of the fruit in the main sales outlets and in the restaurants of the larger Italian cities.

PRICE TRENDS AT THE FARM GATE AND WHOLESALE

The analysis of cactus pears' price dynamics at production and wholesale have only allowed us to arrive at purely indicative results about the evolution shown in the last 15 years, mainly due to the limited set of statistical data which was available.

Data about prices at production refer to a degree of preparation of the fruit still hanging on the plant, and this is relative to the most common form of sale of cactus pears, which – as already stated – is that of ex farm, with harvesting charged to the buyer. The methodological choice of operating on business prices is justified on the one hand by the absolute lack of official statistics acquired systematically for cactus pear prices and on the other, by the fact that the businesses under survey give an articulated and sufficiently representative sample of cactus pear cultivation and, therefore, the prices registered are highly reliable for the significance of what was calculated.

From the analyses carried out, data was obtained which, once converted into 1999 prices (to analyse the changes in real terms), showed a negative trend: prices at production, referring to years which are normal in terms of seasonal performance and market situation, seem to have gone down, in real terms, by about 25% to 30% in the course of the last 15 years, passing from about US\$0.45 to US\$0.50 (900 to 1000 Lire/kg) in 1984 to US\$0.3 to US\$0.35 (600 to 700 Lire/kg) in 1999. This reduction can be attributed mainly to a continuously expanding supply.

This phenomenon has contributed, together with a rise in production costs, to determine a slight drop in profits, with unfavourable repercussions on the profitability of capital and labour investments and on employment in this sector.

As far as wholesale prices go, the analyses were carried out using official statistical data from the Chamber of Commerce, Industry, Craftwork and Agriculture in Catania, which as is known, issues the market-report of average prices per kilo for the principal fruit and vegetables bought and sold in the province, among which is the cactus pear. For this product, with reference to the time series under consideration, the prevailing monthly prices were taken, referable mostly to “scozzolato” cactus pears and the corresponding annual averages calculated by the Chamber itself.

The wholesale prices found were then analysed with reference to the sales campaigns from 1983 to 1999. These figures are useful for identifying a general idea of the level and trends of cactus pear prices, the only limitation being that they do not take into account the different types and categories of product, and the separate minimum, maximum, and average values (prevailing or not).

The information has been brought together in a table which gives the weighted average annual wholesale prices per kilogram of cactus pears, expressed in current Lire and 1999 constant Lire (Table 3). In order to get more rapidly to the price evolution, some concise indexes were calculated on figures in 1999 Lire. These were calculated by comparing each year's prices to a base value for the period (the average of the three years 1983-1985). The evolution of the wholesale prices of cactus pears in the province of Catania, as can be seen from the variations in the index figures, has been decreasing steadily since 1986, except for the years 1994 and 1995, which show exceptionally higher prices. The high peak years were distinguished by an influx onto the market of goods of a high qualitative standard ("super-extra" and "extra"), so that the relative price increase was dramatic, showing how consumers prefer high quality goods. Except for those two years, wholesale prices have been decreasing steadily from a peak index value of 128 in 1986 to current values of 69 and 76 for 1998 and 1999, respectively.

Table 3. The Evolution of Wholesale Prices of Cactus Pears in the Province of Catania (1983-1999)*

Year	Current Price (Lit./kg)	Constant Price (1999 base year)	
		Absolute Values (Lit./kg)	Indexes (average 1983-1985 = 100)
1983	1,150	2,479	99
1984	1,280	2,495	100
1985	1,420	2,549	102
1986	1,900	3,214	128
1987	1,600	2,587	103
1988	1,800	2,773	111
1989	1,475	2,132	85
1990	1,353	1,843	74
1991	1,723	2,206	88
1992	1,878	2,280	91
1993	1,822	2,123	85
1994	2,701	3,029	121
1995	2,792	2,972	119
1996	1,787	1,830	73
1997	1,758	1,770	71
1998	1,740	1,721	69
1999	1,900	1,900	76
	23,7	19,3	
Variation coefficient (%)			
(*) Source: G. Timpanaro. in Basile F., ed., 1996, pg. 165, for the period 1983-1995. For the years 1996-1999, our calculations of prices given by the Chamber of Commerce, Industry, Craftwork and Agriculture of Catania. These prices mostly refer to "bastardoni". The prices published in the source at current currency were converted into constant currency using the coefficients calculated by ISTAT on the basis of wholesale price indexes.			

The variability of wholesale prices expressed with a variation coefficient (lower than that of prices at production), was found to be 19.3%. The matured trend was negatively influenced by the single annual figures, as can be seen from reading the indexes.

CONCLUSIONS

In conclusion, it must be noted that the prospects of success for cactus-pear cultivation are increasingly linked to the possibility of improving the organisation of the market for this cactacea. Today, this is still lacking, but it could be improved also and above all by an articulated presence of public policy which could set up commercial structures (storage, deprickling, refrigerating centres, etc.), markets organised in the production zones, and the adoption of adequate promotion and advertising measures, all of which could contribute to exploiting the product under examination to the full and maintaining satisfying levels of profitability for its cultivation.

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