

MORE INFORMATION ABOUT PRICKLY PEARS

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1 The Prickly Pear Festival

Sagra della Mostarda e del Fico d'India

Militello in Val di Catania,
Sicily

Now when you pick a pawpaw
Or a prickly pear
And you prick a raw paw
Well next time beware
Don't pick the prickly pear by the paw
When you pick a pear
Try to use the claw...¹

Good advice indeed. When Francesco Le Favi picks the prickly pears that have ripened on the cacti he cultivates on his *azzenda* in the rolling hillsides just outside his home in Militello in Val di Catania in Sicily, he's careful to wear an apron as well as thick plastic gloves to protect both hands and forearms, and goggles to protect his eyes.

Two kinds of spines form a highly effective deterrent to anyone thinking of meddling with the fruit of these formidable plants: as well as the fine, short, hair-like prickles (technically known as glochids) that occur in evenly-spaced clusters all over their outer skin and which attach themselves with ease to human skin, there are long, needle-sharp spines at the top of each one. Francesco, who fell in love with prickly pears as a teenager and who now runs his business growing and

selling them with his brother Salvatore, uses a machine specially designed to relieve each fruit of its assorted weaponry, before they're carefully washed and packed in boxes ready for sale.

In October 2019, setting out from England, I travelled with my partner John, who drove our camper van, first across France and then by boat across the Mediterranean, from Toulon to Trapani on Sicily's west coast, to find out more about the island's prickly pears. While all the main production regions boast prickly pear celebrations, our goal was to experience *the Sagra della Mostarda e del Fico d'India* - the festival of the prickly pear and 'mostarda' (a product made from the juice), held each October in Militello in Val di Catania, some 35 kms south west of Catania, Sicily's second largest town, to celebrate the cultivation of this curious fruit.

Italy is truly a land of food festivals – there are *sagre* for everything, from asparagus to swordfish to be found the length and breadth of the country, joyous occasions on which communities, large and small, celebrate often over several days, what they produce (though now mostly with a strongly commercial undercurrent) or what makes them locally distinctive.

The *sagra* in Militello in 2019 took place over the two weekends in the middle of the month. We arrived to find the beautiful ancient hill-top town, with its winding streets, historic churches, and pastel-painted buildings, 'baroque' in style (mostly dating from the 18thC when much of the town was re-built following the earthquake of 1693), in preparation mode: small tented stalls being erected, posters displayed and an atmosphere of genial anticipation in the air. Having landed on our feet by finding, by good fortune, an exceptional place to stay - an apartment owned by the wonderful Antonio complete with roof terrace that offered fantastic views over the town, we were greatly assisted by the town's *Operatore dei Beni Culturali Archeologici*, Sebastiano Lisi (in charge of the town's cultural and archeological heritage), who opened the doors for us to the world of Sicilian prickly pears.

Sebastiano arranged for us to meet the area's main producer - the hugely generous Dr Francesco Le Favi and his family: wife Giuseppina and daughters Roberta and Angela. On the appointed day, they came to greet us in the Piazza Municipio bearing not just a box of prickly pears, but so much good will and

kindness we were humbled and overwhelmed. The next day, with the assistance of José, a family friend and English teacher who generously acted as interpreter - correcting the many questions I had prepared to ask in my beginner's Italian and translating the answers - we were driven to Francesco's *azienda* nearby for a guided tour.

Francesco explained how he had come to cultivate prickly pears, but first he told us, with much pride, about his father. Angelo Le Favi, we heard, had been a trade union man. Having gained a diploma in chemistry, and subsequently been employed by Fiat in Turin, he had been sent back to Sicily by the company to work on the development and production of cement. The company had, in the 1950s obtained a license to begin building a bridge between Sicily and Calabria, on mainland Italy and Angelo was at the head of the research into the cement that should be used in its construction. Unfortunately, prolonged and unprotected exposure to the chemicals involved led, Francesco is sure, to his father contracting cancer and subsequently dying in 2011.

In 1985 however, when Francesco was just 15, his father had introduced him to an inspiring teacher of agronomy, Dr Zafferana. It was this man, Francesco explained, whose knowledge of prickly pears, imparted during seminars in Militello, led him to 'fall in love' with them. Francesco, one of only four students in attendance, was hooked after the very first class, asking his father only an hour later if he could begin growing them himself.

An abandoned area of land that had formerly belonged to his grandparents was transferred to Francesco and his brother Salvatore, who holds a masters degree in finance and commerce and their joint business '*Clizia*' began.

At its height, some 10 years ago, Francesco and Salvatore were tending some 7,000 plants, and supplying outlets across Italy, but the recession affected them considerably, reducing demand, particularly from the foreign customers in other parts of Europe who had been supplied via Milan. They now have only 2,000 plants and, while formerly an important local employer, now pick and prepare all the fruits themselves and sell to customers directly.

Cultivated plants (spineless forms, thought to have been introduced from Spain when the cacti were first introduced to Europe²) begin life as cuttings – cladodes

being taken from mature plants in late Spring. Although they will grow happily on poor or stony soil without intervention, they may be pruned to achieve balanced growth and good light penetration and also weeded, fertilized and irrigated during their life-times, to achieve optimum results.³ The cacti are sometimes intercropped with vegetables such as artichokes or legumes.⁴ Growing very quickly, and able to reach impressive size and a height of around 5 -7 m⁵ (though maintained at about 2-3m high in Sicily⁶), the cacti are long-lived, exceeding 80 years.⁷ Francesco has described them as 'practically eternal'.⁸ Perhaps unsurprisingly, they are also valued as wind-breaks and for making stock proof enclosures. Plantations and hedges were estimated in the early 2000s to cover about one million has in the Mediterranean region.⁹

Prickly pears begin to produce their colourful flowers (bright yellow, becoming orange by the time the petals fall) in May each year. Once pollinated – by bees, especially bumble bees¹⁰- these flowers will develop fruit that are ready for picking between July and August. An ancient custom however - the *scozzolatura*¹¹ - is to remove these first flowers, and young 'pads'¹² or first fruit while they're still immature to prompt the cacti into a second flowering.

Removing the fruit from May onwards will result in new flowers, from July onwards that develop into *fichi* ready for harvest from October to December.¹³ There is regional variation however, concerning the *scozzolatura* so that production can be staggered. While part of the first flowering may be retained, so that the fruits produced may be sun-dried for eating during the winter or turned, for example, into the traditional '*mostarda*' the fruit selected and retained as a result of this second flowering, called '*bastardoni*', are bigger and tastier with fewer seeds than those that preceded them and are preferred for eating.

Their juice (obtained by squeezing the flesh through a cloth) is also extracted and boiled until it forms a dense syrup '*monaccioli*' useful for flavouring desserts or diluting with sparkling water as a drink, or further transformed into locally distinctive products. A number of these were on display, available for tasting and to buy, at the *sagra* we had travelled to see in Militello.

At various locations in the town, chiefly the Via Porta della Terra and the Atrio del Castello, which were the main focus of the festival's display of traditional

products, aproned men were standing over metal pots heated by braziers, stirring their contents with long wooden paddles. The pots contained *mostarda* – not in fact a type of mustard, as its Italian name suggests - but a gelatinous brown substance made by cooking prickly pear syrup with the addition of semolina and the all-important *vino cotto* – a dark, sweet, thick syrup made by cooking grape or fig ‘must’ very slowly for many hours until the sugars have caramelized.

The tradition is to serve this *mostarda* to passers-by in little dishes, to be eaten with a spoon like a dessert, often with a sprinkling of almonds and sugar. It’s also candied and made into *mostaccioli* (*mastrazzola* in Sicilian dialect), beautifully patterned solid shapes, slightly rubbery and similar to liquorice in texture, with a sweet taste that is difficult to define. To make them *mostarda* is tipped while hot into oval or rounded ceramic moulds which carry the exquisite designs and motifs - a dolphin, for example, or various fruit, an interlacing of stylized leaves and flowers or human figures - that will be replicated on their upper surfaces when they’re set and removed from the moulds.

We sampled prickly pear ice cream – sorbets were on offer too – as well as the delicious *Amaru Unnimaffissu* liqueur¹⁴ – technically a ‘bitter’ invented in the Catania region only in 2013, using local prickly pears, orange peel and carob as well as aromatic herbs.

Lining other streets, beyond the central area where these products could be found, a plethora of other stalls sold unrelated merchandise – the occasion having been generally accepted it seems, as an opportunity for other traders to sell their goods – from bags of pistachio nuts harvested on the slopes of Mount Etna (visible from Militello on a clear day) to fridge magnets and clothing that was probably made in China.

None of this distracted however, from the excitement and sense of occasion of the whole event. The *sagra* attracts thousands of visitors each year, who come not just to sample or buy products, but attend the various cultural entertainments and evening concerts that are specially arranged. The main attraction however, is a spectacular equestrian display which takes place on the last day of each of the two festival weekends. A dozen horses regaled in an astonishing array of brilliantly-coloured feathered pom-poms and elaborate tassels as well as richly decorated drapery parade through the ancient streets, each pulling an equally

colourful cart, painted mostly in red, green and yellow and decorated with carved or painted heraldic motifs or historic scenes. Each cart carries men and children in traditional dress, the adults playing traditional instruments. As we stood and watched the procession on the last day we were there, the hullabaloo was captivating.

This was the 29th *sagra* to be held. The idea, we were told, had been proposed in the mid 1980s by a close friend of Francesco's father - Professor Ruscica of the *Ente Sviluppo Agricolo* or Agricultural Development Body - a man who had striven to protect the rights of agricultural workers at the time. As a much-loved local celebration of what the prickly pear has meant and continues to mean to the people of Militello, the *Sagra della Mostarda e del Fico d'India* looks set to continue.

But what of the prickly pears themselves, how will the future unfold for them? Whilst cactus crops are the object of increasing attention around the world not only because of their ability to thrive on drought-ridden, degraded land where no other crops will grow and provide raw materials with a wide range of economic uses but also as part of a potential strategy to reduce the accumulation of CO₂ in the atmosphere¹⁵, Francesco, who also grows almonds on the island, has some serious concerns about the future viability of the crop, certainly as a commercial enterprise. Climate breakdown, propelled by global warming is causing real problems for the cacti. He's noticed that the Summer sun is now too hot – it's scorching the cacti's fruit. And this year, in September, for the first time ever, a hail storm dropped pellets of ice from the sky damaging the pads. This is a worry as wounded plant tissue provides entry sites for bacteria and fungi into the plant.¹⁶

He has noticed fewer bees too – the chief pollinators of the cactus flowers. What will happen, he asks, if the bees disappear? With so much out of balance there's the additional worry that the Mediterranean fruit fly *Ceratitis capitata* that can already cause considerable harm – laying its eggs inside the pears so that the developing larvae eat them from the inside, causing them to rot and fall to the ground - may proliferate. Unlike many of the growers in San Cono, Francesco's fruit are produced organically without the use of chemicals.

It remains to be seen whether appropriate action can be taken quickly enough by governments around the world to properly address the massive threat that climate breakdown poses to us all, to save the flora and fauna on which we all depend, including Sicily's prickly pears.

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2 What is a Prickly Pear?

Opuntia ficus-indica is the world's most widespread and most commercially important cactus. It is just one of numerous *Opuntia* species all native to the Americas. Their readiness to hybridize however and the considerable outward variation shown by different populations of this particular species, alongside a plethora of different local names, have resulted in considerable taxonomic confusion, now being unraveled with DNA sequencing. ¹

'*O. ficus-indica* is considered a species, or a group of multiple unrelated clones derived from different parental species. The native distribution area of the ancestral taxa is central Mexico'. ²

3 An Ancient Crop – cultivation in Mexico

The prickly pear - ***nopal*** in Mexico, from the Nahuatl *nopalli* - is thought to have originated in the Central Mexican plateau ³ and to have been domesticated there, a process believed to have begun many thousands of years ago.⁴ It was being cultivated by the peoples of Mesamerica in the distant past including the Nahuatl-speaking peoples, commonly referred to as the Aztecs. When the conquistador Hernán Cortes arrived in Tlaxcala in central Mexico in 1519 he was welcomed with prickly pear fruits. It was a cultivated, spineless form that was introduced to Spain from the Americas⁵, the result of a long process of selection.

Mexico's coat of arms, which shows an eagle perched on an *Opuntia* cactus clutching a rattlesnake, refers to the legend that explains the founding of the Aztec capital Tenochtitlan (a name which translates as 'prickly pear fruit over a rock'). The god Huizilopochtli of the then nomadic tribe, the Méxica, had commanded them to find an eagle devouring a snake on top of a cactus as a divine indication of where they should build their home. They found this on a small island in Lake Texcoco, which then became their centre.

The Codex Mendoza – a detailed record made in the mid 16thC of daily life in central Mexico before the Spanish invasion, as well as a history of its rulers and

their conquests – depicts this same scene on its first page and prickly pear pads appear in Aztec tribute rolls.

Many different species of *Opuntia* were recognized and the cacti were important in a number of ways: not just as food (both fruit and ‘pads’), but for building materials, firewood, glue, stiffening cloth and strengthening mortar, ⁶ as a binding and water proofing agent in adobe,⁷ as a medical aid for healing fractures ⁸ and as a host plant for the cochineal insect, a use also indicated in the Codex mentioned above.

Today, the prickly pear is the world’s most widespread and commercially important cactus ⁹ cultivated as a crop plant in many of the arid or semi-arid regions of the world, indeed almost everywhere that has a Mediterranean or tropical to sub-tropical climate on all the continents apart from Antarctica.

In Mexico, where the genetic diversity of *Opuntia* is highest and a large number of species are cultivated across some 3 million has of arid and semi arid land,¹⁰ commercial production is today most highly developed and it is reported to be as important as maize and tequila agave in the agricultural economy.¹¹

4 Prickly Pear fruit

While Italy provides about 12% of world consumption, Mexico is the world’s largest producer of prickly pear fruit supplying about 80%.¹² Here, as well as being eaten fresh, the fruit pulp may be turned into preserves or dried and ground into flour for use in cakes. The juice may be drunk as a soft drink, reduced to a syrup or further reduced to a paste that may be fermented and turned into a traditional alcoholic drink *colonche*.^{13 14}

The Nahuatl name for the fruit of the prickly pear is *nochtli*, but many other regional names are used in the countries in which it is eaten. In the Spanish-speaking world it is commonly referred to as tuna, a word said by the explorer Alexander von Humboldt, to have come from the Taino, an Arawak-speaking

people of Haiti ¹⁵, entering the Spanish language from the beginning of the 1500s.

5 Prickly Pear pads (cladodes)

With their thick, waxy, water-proof outer skin, the fleshy pads, like the cacti themselves, (referring to various species of *Opuntia*) are known in Mexico as nopales. Developing their succulence (and comprising a mixture of mucilage and pectin) as an adaptation to the dry conditions they flourish in, they store water, enabling the cactus to withstand severe drought. These distinctive flattened stems, often referred to as *palas* ('shovels') in Spanish, have a variety of traditional uses.

As a food, they are typically sliced into strips, and, with or without their skin, cooked and eaten as a vegetable. In Mexico *nopalitos* - tender, young cladodes – are an important component of the diet in many rural areas, and may also be used as an ingredient in a range of dishes including sauces, salads, soups, snacks, pickles, drinks, confectionery and desserts.¹⁶ Typical dishes include '*huevos con nopales*' (fried eggs with *nopales* and *jalapeño* peppers) or '*tacos de nopales*'. Though usually sold fresh, they are also available bottled or canned. They can be dried too and ground into flour, providing a rich source of dietary fibre.

In Sicily they may be sautéed and eaten, for example with tomatoes on *bruschetta* or as an addition to omelettes.¹⁷ There, in the San Cono district, one producer is reported to be making pesto and a paté from the pads.¹⁸

In various parts of the world, including southern Italy, they have become an important animal fodder.¹⁹ On the island of Pantelleria, between Sicily and Tunisia, when grass is scarce they are fed to pigs, cattle and goats.²⁰

The juice (or gel) extracted from the pads can also be drunk: 'tasty fruit juices prepared as aperitifs' are reported to be made in Sicily.²¹

With their high Vitamin C content, navigators both benefited from the cactus by carrying it with them on their voyages to guard against scurvy, and incidentally increased its spread around the world.²²

The many health benefits attributed to the all parts of cactus have led to a large number of scientific studies over the years.²³

6 Medicinal Uses of the Prickly Pear

Cacti have been used for medicinal purposes since ancient times. In Mesoamerica their use is said to date back some 12,000 years²⁴ - fresh cacti having been consumed during this period both for their nutritional and therapeutic properties to cure diseases and heal wounds. In several countries cladodes, fruit, seeds and flowers are reported to have been used as natural medicines for the treatment of many diseases for centuries, a use that continues in folk medicine today.²⁵

Prickly pear flowers are reported, in Sicily, to be widely used by herbalists.²⁶ They are said, for example, to be 'excellent as a diuretic and for heartburn'.²⁷ The diuretic effect is reported to be derived from the flavonoid substance 'isoramnetjny'.²⁸

Use of the flowers was recorded on the island of Pantelleria (between Sicily and Tunisia) in the 1970s to be 'infused into a tea believed to be good for kidney troubles', while dried and made into a paste they were 'applied to the skin to help relieve measles'.²⁹

A tisane made from the flowers is reported today to be drunk on Pantelleria to promote good health in general and to alleviate stomach ache and colic in babies, and with the addition of *Laurus nobilis* leaves as a treatment for colds.

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Medicinal claims made for the juice of the fruits, which are rich in Vitamin C, flavonoids and antioxidants, include anti-ageing and anti-inflammatory activity, and the promotion of optimal cellular health as well and detoxification of the body.³¹

In Sicily, where the prickly pear has long been used as a popular medicine,³² the pads are said to be a traditional cure for gastroenteritis,³³ and 'a local anti-inflammatory remedy for edemata and arthrosis, as regulators of smooth musculature in the treatment of whooping cough and as anti-infective agents'.³⁴ Young cladodes are also reported to be useful in reducing obesity and lowering blood glucose levels.³⁵ Dehydrated and powdered cladodes are available in pill and capsule form.

When applied directly to the skin, the juice and pulp of prickly pear cladodes are claimed to have considerable healing and moisturizing properties, explaining their use in 'cosmetology and phytotherapy'.³⁶ Visiting the island of Pantelleria, Cassandra Quave and Alessandro Saitta reported, in 2016, the use of the fleshy inside or the juice as a treatment for burns and the warmed flesh for wounds or bruises.³⁷

Of the prickly pear in general, it has been reported that 'several scientific researches have highlighted [its] effectiveness in treating diabetes, in controlling the levels of cholesterol in the blood, in the treatment of obesity, gastrointestinal disorders and skin diseases'.³⁸

Moving from human health to plant health, a recent (2017) study of the antiviral activity of an extract of prickly pear cladode concluded that the cactus 'can be regarded as an encouraging source of antiviral protein to develop environmentally-friendly compounds for management of plant viral diseases'.

³⁹

While it is generally recognized that some constituents of the cactus show 'promising characteristics as health-promoting substances',⁴⁰ - scientific studies having 'confirmed that fruits and cladodes of cacti may be efficiently used as a source of nutrients and phytochemicals, (e.g. sugars, mucilage, fibres, vitamins and pigments) of nutritional and functional importance'⁴¹ - it is also felt that more scientific research is required in the assessment of the functional properties of the prickly pear in the food, cosmetic and pharmaceutical industries.⁴²

7 Non-medical uses of the Prickly Pear

Numerous other uses and potential future uses of the cacti are reported. As well as the use of the plants (mentioned in the main text) as animal fodder or as a forage complement,⁴³ in Italy, this also includes the use of the pads on the island of Pantelleria (where the prickly pear is 'highly ranked as a multifunctional plant') as wind barriers and sun shades for protecting other cultivated plants such as tomatoes and aubergines.⁴⁴

In parts of rural Sicily, the pads have been used as improvised plates for eating the midday meal on⁴⁵, or by making use of their convex shape, for collecting manna (the sap extracted from *Fraxinus angustifolia* trees).⁴⁶ The pads were also used to construct a bird trap in the past.⁴⁷

Construction of furniture from cactus fibres which are extracted and then pressed together in layers is also reported from Sicily⁴⁸

A University of California publication also documents: 'The pads can be pounded and dried, and the strong fibers woven into mats, baskets, fans, and fabrics. Pressed fibers can be used in making paper. The large spines are used as toothpicks, needles, and pins. Even the woody skeletons left after the fleshy tissues is dried can be used in the construction of houses, rustic furniture, and assorted trinkets'.⁴⁹

The same source adds: 'The stickiness of the sap makes it useful in formulating various products. It can be extracted to make chewing gum and candles, and is used as a stiffening agent for cotton cloth. A common use in rural areas of Mexico is to boil it down into a concentrate and mix it with whitewash and mortar to increase the durability of buildings.'⁵⁰

While the mucilage within the cactus pads has a long-standing use as a binding material as an ingredient of adobe, new uses said to be under investigation include water purification and as a non-toxic dispersant for oil spills,⁵¹ and of the whole plant as a source of bioenergy, including biogas produced with the addition of animal manure, biodiesel and ethanol.⁵²

The oil obtained from the fruit's seeds meanwhile, which are rich in polyunsaturated essential fatty acids such as linoleic acid (as well as being a source of fibre and protein)⁵³ is now being used in cosmetics.⁵⁴

In conclusion, as a multipurpose dry-land crop, the prickly pear is it seems, set to become more important as global warming and desertification increase, offering much potential for developing countries in arid regions,⁵⁵ its goods and services also including soil and water erosion control; regulation of climate through carbon sequestration; biodiversity conservation and an important habitat for wildlife.⁵⁶

8 Cochineal

Perhaps the most famous use of the prickly pear is as the commonest host plant for the rearing of cochineal insects (*Dactylopius* spp.) for the extraction of red dye (carminic acid) they contain. Because of its high pigment content - up to 20% - the species most commonly used commercially is the domesticated species *Dactylopius coccus*.

The dye was used by both Mayan and Aztec peoples – who referred to it as *nochetzli* (literally 'blood of cactus' in Nahuatl, a name used also for the insects.⁵⁷ Ancient records show that it was being paid as a yearly tribute to Montezuma in the 15thC. After the Spanish conquest and because of high demand from Europe, by the end of the 16thC the production of cochineal in Mexico had grown to become the second most valuable export after silver.

As described by Barbera, Carimi and Inglese in their study⁵⁸ of the historic and contemporary role of the prickly pear in Sicilian agriculture, it was in part the production of cochineal that attracted Europeans to import the cactus:

'They were attracted not only by their unusual morphology but also by the importance the Aztecs attached to prickly-pear cacti in their economic, social, and religious life. Among the various uses of these species, that of the greatest commercial interest was linked with the production of a red dye which was obtained from the body of a cochineal insect (Dactylopius coccus Costa). The

first quantities of the dye which arrived in Europe were so highly-valued that soon an attempt at cultivation of prickly-pear cacti was made in the Canary Islands and Spain (Nobel 1988; Russel and Felker 1987). The attempt was successful only in the Canary Islands where, on Lanzarote, the breeding of the cochineal is still carried out today.'

Imported as a powder, referred to by the Spanish as *grana cochinilla*, the dye was extremely popular because of its intense red colour. After a period of decline in demand, which began in the 19thC, cochineal has become valuable commercially once more, partly because many synthetic food colourings and dyes have caused concern as carcinogens and production is now being re-established in many tropical and subtropical parts of the world.⁵⁹

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