

Saccharum officinarum

[Synonyms : *Saccharum atrorubens*, *Saccharum barberi*, *Saccharum fragile*, *Saccharum glabrum*, *Saccharum hybridum*, *Saccharum infirmum*, *Saccharum luzonicum*, *Saccharum obscurum*, *Saccharum rubicundum*, *Saccharum sinense*, *Saccharum violaceum*]

SUGAR CANE is a hybrid perennial grass or reed. Probably native to the Ganges Delta in India or to Indonesia it has tiny mauve-grey flowers.

It is also known as *Abàh* (Indian), *Ahwerew* (Twi), *Azúcar* (Spanish), *Azúcar de caña* (Spanish), *Caná de Açúcar* (Portuguese), *Canchi* (Chinese), *Cannamelle* (French), *Canne à sucre* (French), *Cheraku* (Telugu), *Dovu* (Fijian), *Ganna* (Bengali, Hindi, Punjabi), *Ik* (Indian), *Ikshu* (Malayalam, Sanskrit), *Kaguli* (Indian), *Karumbu* (Tamil), *Kigwa* (Kikuyu), *Ko* (Hawaiian), *Khulea* (Indian), *Kufsch-us* (Arabic), *Nai-sukr* (Persian), *Oy* (Thai), *Qasab sukkari* (Arabic), *Saccarosio* (Italian), *Seker kamisi* (Turkish), *Sherdi* (Gujarati), *Sockerrôr* (Swedish), *Sucre de canne* (French), *Sugar*, *Sukkerrolr* (Danish), *Tebu* (Javanese, Malay), *Tiwu* (Sundanese), *To* (Tongan), *Tolo* (Samoan), *Tubó* (Filipino/Tagalog), *Uch Ghanna* (Indian), *Uk* (Indian), *Uk-gas* (Sinhalese), *Ukyo* (Indian), and *Zuckerrohr* (German).

The cane (stem) is shredded and compressed through rollers (generally more than once) to squeeze out the juice. This juice is sometimes allowed to evaporate and crystallize at this stage. Usually however it is spun at a high speed and the evaporated juice is then allowed to separate into solid (brown sugar) crystals and a liquid (molasses). Further evaporation, fermentation and/or distillation can yield liquor, vinegar and white sugar. When the sugar has been extracted the remains of the stems is called ‘bagasse’.

Officinarum means ‘of the shop (usually the apothecary’s or herbalist’s)’. Certain plants used for medicinal purposes, whether of actual or legendary value, were kept readily available and acquired this name.

From long before the first centuries AD it is known that Indians from the south of the sub-Continent – as well as inhabitants of other south-eastern Asian countries including Indonesia and Malaysia – chewed the sweet-tasting raw cane and used the leaves for thatching) as they still do today. Locally they learnt how to boil the stems of the wild plant (not today’s cultivated hybrid) and dry the product in the sun to obtain whitish, unrefined sugar cakes. Indian legend tells how Buddha’s ancestors came from Gur (today’s Bengal) and the land of sugar, and the Sanskrit *Ramayana* that dates back to about 1200 BC contains a description of the arrangements for a banquet at which canes were to be chewed. There is then a gap in time until around 800 BC when it has been suggested that the Aryans (who had originally invaded northern India in about 1500 BC) now began to cultivate sugar cane in northern India as the Dravidians had long done before them. However the Dravidians had not found out how to make sugar (they had used the cane to produce molasses) whereas by 500 BC historians believe that the Aryans had actually devised a machine for making sugar crystals.

The spread of sugar cane beyond south-east Asian lands is still open to considerable debate and the following sequences are by no means certain. There is little doubt however that sugar processed from the cane generally moved far faster than the plant itself or the handling or processing techniques.

Sugar's introduction to the Middle East is attributed to Darius I (548-486 BC) who seized the Persian throne in 521 BC. He made conquests outside his borders and his Eastern incursions penetrated as far as the Indus valley which was then part of India. From the Eastern forays he returned home with plants that were described as
a reed that gives honey without the aid of bees
and these enabled the Persians to begin to develop their skills in the successful cultivation of sugar cane – and the eventual manufacture of sugar. But it seems according to records that not only were the crops closely guarded but also that the plants did not spread far beyond Persian borders (if at all) and their sugar was not exploited as an export commodity at that time. Authorities are understood to attribute the further spread of sugar (as a commodity – not the plant itself) in the Middle East to the Assyrians. Through them the Phoenicians trading on the Syrian coast, and the ancient Egyptians, both became familiar with sugar syrup in particular which they respected as a rare and expensive medicine.

Sugar itself was not unknown to the ancient Greeks either. One of their noted philosophers, Theophrastus (c.372-c.287 BC) is understood to have referred to the plant in passing when describing

..... three kinds of honey, that of the flowers, that of the dew, and
that which flows from a reed

although it is thought by authorities that this was based on hearsay. During Theophrastus' lifetime Alexander the Great (356-323 BC) was expanding the Macedonian Empire. His furthest marches took him onto the Punjab plain in India where in 326 BC he overran the opposition of 40,000 men and 200 elephants posed by the rajah, Porus. During this campaign his admiral, Nearchus is said to have observed how the Indians had learnt to boil and evaporate the sweet juice from the sugar cane to produce sun-baked sweet, whitish cakes. For most Greeks however (as elsewhere in the eastern Mediterranean) sugar was to remain a rare medicine. When it first reached European Mediterranean countries it was often called 'white salt' or 'Indian salt'. A more informed comment by the Greek physician, Pedanius Dioscorides (1st Century) who considered sugar to be one of his invaluable remedies amplifies the names further.

There is a kind of solid honey called *saccharon*, which is found in the reeds of India and Arabia the fortunate. It resembles salt in consistency, and crunches in the mouth.

And in the following century his peer, Galen (c.130-c.201) was to agree with Dioscorides that sugar was a priceless medicine.

The Romans from late BC onwards are said to have had access to sugar and they knew that it was extracted from a grass similar in appearance to bamboo. Authorities appear to suggest that Rome imported sugar cakes via Arabian caravans from India (not the nearer Persian lands) – but they never obtained the plant itself. Apart from the very rich in Rome it seems that few other Europeans were aware of this expensive and luxurious 'spice' that still continued to be thought of primarily as a medicine. It is believed to have been the Roman scholar and author, Marcus Terentius Varro (116-27 BC), who provided the first description of the plant – and also how the Persians prepared sugar from it.

The catalyst that led to the spread of sugar more widely in Europe was probably the Arabian incursions that began in 633 following the death of Mohammed (c.570-c.632). In the name of Islam the Arabs began to relinquish their nomadic life and conquer large parts of the Near and Middle East by defeating (relevantly for sugar) the Persian and Byzantine armies. Co-incidentally their crusades brought them into direct contact with other cultures that then influenced many of their own practices. Pertinent in this context they became agricultural and culinary experts on sugar cane and its processing – and sugar and its uses

– and spread their knowledge as they progressed through the Mediterranean eventually as far west as Spain. The Arabs first introduced the sugar plant to Egypt in the early 640s after the fall of Alexandria in 641. They also took it to Syria, Cyprus and Crete. They took it to Spain by about 714 and they took it to Sicily in the beginning of the 9th Century (where they remained until 1060). Sugar itself was carried elsewhere as well. They reorganized the Persian sugar industry and established sugar plantations and refineries throughout the Mediterranean. (The one on Cyprus was established in about 1000 AD.) The ultimate success of their Spanish undertaking alone is apparent when one notes that by 1150 the Moors had 75,000 acres under cultivation there to cater for the manufacture of sugar. (Four years earlier the Venetians recognizing the glint of the Arabian ‘sugar-mine’ built a warehouse to enable them to export sugar to Central Europe.) One of the Arabian inventions, caramel had a strange initial use - that of hair remover for the ladies of the seraglios.

Meanwhile sugar was also making its presence felt in the East. Authorities still debate the original species in the genus that were native to several Asian countries. It would seem that there were and are (today even more so) many variations of the plant. Certainly it is believed that this genus was represented in China but was not exploited there for any sugar it might have contained. The Chinese long imported sweetener (most likely made from palm sap) from Javanese traders. Authorities believe that the sugar-making art (using sugar cane not palm sap) probably reached Java (now part of Indonesia) from India only in the early centuries AD. (Prior to this the Javanese like their neighbours used the sugar cane as a chewing medium and palm sap as food sweetener.) However by the late 3rd Century the technique of processing sugar cane had spread to what is now northern Vietnam. Although the Chinese have laid claim to discovering how to make cane sugar, authorities believe this is doubtful as 7th Century Chinese records state that a past Emperor had sent a mission to Bengal in India ‘to learn the art of making sugar’. That same Century they certainly acquired expertise in refining the sugar obtained from the Arabs of Cairo.

It is debated among authorities as to who first developed methods of refining the sugar. Some suggest that it was Nestorian monks in Persia in 600, while others support the Arabs who without doubt practised these methods. In fact the latter in Cairo were quickly hailed by India for preparing a superior sugar. Much of the Arabian culinary expertise, and their general predilection for sugar which led them to use it like salt on food was absorbed by those who met them. By now sugar was being sprinkled with almost wild abandon over food in many of the rich western and northern European kitchens and added indiscriminately to sweet and savoury dishes alike. Apparently in France in 1380 Charles the Wise (Charles V (1338-1380)) was sprinkling sugar and cinnamon (*Cinnamomum verum*) over toasted cheese. By at least the 15th Century Italian traders could be found selling the expensive commodity in the form of sugar cones. These looked like the heads of shaggy cap mushrooms – and it was from them that the sugar was grated. (This cone shape was eventually to turn into a block that then persisted until the 19th Century.) Italian confectioners by the 16th Century are said to have been renowned for the intricacy of their delicate, spun sugar sculptures. Venice published a sugar cookery book in 1541 and the French translated and produced it in Lyons in the following year. It was in Lyons also that another book (half of which was on cooking with sugar) was published in 1555 by someone who for many would be the most unlikely author – the French physician and astrologer, Nostradamus (1503-1566). Although widespread use of sugar among the wealthy was slowly penetrating less well-off homes in southern Europe, poorer people in the countries of northern Europe continued to rely on honey as a sweetener. Even by this time with its lavish application in the rich kitchens, it was still thought of primarily

among the populace as a whole as a medicine – and as such was only available from apothecaries' shops where it was often called 'reed honey'.

As mentioned earlier the Venetians exported sugar to central and northern Europe from about 1000 AD. (During the Crusades their efficiency knew no bounds as they transported Crusaders to the Middle East and filled their ships on the return journey with spices – and processed sugar. And by the 15th Century they had established their own refineries for processing raw sugar.) What was not pointed out was the fact that when the sugar left the Venetian warehouses the price was high but by the time it ended up in northern France, in the Low Countries or on English shores the cost had become extortionate. Its journey overland was laced with tolls as towns and feudal lords profited from its passage across their territory. This principle applied of course to all the exotic spices and goods that came from far away lands through the auspices of the Venetian traders and must have been one of the significant factors fuelling the growing desire in northern European minds to trade directly with the commodities' sources. One step in this direction which alleviated some of the costs was the eventual establishment of sea routes from northern Europe.

Before sugar reached the New World some authorities claim that the stage was set for the impending inhumanity in plantation management by the introduction of cane to the Azores, Madeira and the Canary Islands. Europe's prime sweetener, until sugar took over, had been honey and the Canaries still boasted honey as a major export to that Continent even in the 16th Century (some of the Islands were particularly suited to the honey-bee). But by that time sugar was already making its presence felt in the Atlantic islands. In Madeira in 1452 the Portuguese authorized the Island's first water-driven sugar mill. The population had originally been colonized by Europeans and now slaves (initially most of them white) were brought in to build the elaborate irrigation system and work on the sugar plantations – and swell the population further. The size of the irrigation system is illustrated by the fact that the Island is only 60 kilometres long. Yet the tunnels and conduits (that would have been barely large enough for the slaves to crawl through and which passed through very difficult mountain terrain to the plains below) are estimated to have totalled 700 kilometres in length. Twenty years later Madeira was exporting sugar to a large part of Europe. When the Spanish invaded the Canaries sugar was introduced there as well and the first sugar mill on the largest island, Gran Canaria, appeared in 1484. Here forests were devastated to make way for cane fields and slaves were brought in to complement those already available from the native Guanche population. Deforestation on all the Atlantic islands followed sugar's appearance. This led both to erosion and to significant changes in the natural water systems. In turn the environmental changes determined flood or famine and thus the future of the savagely cultivated sugar cane and the communities themselves.

The introduction of sugar to the Americas had at least two particularly significant effects for the World. One was the upsurge of the Slave Trade which had long existed but primarily with non-black captive participants. The other was the eventual recognition that any country that relied upon one crop would be dependent upon outside support for food.

In the early 16th Century the Genoese explorer, Christopher Columbus (1451-1506) took cuttings of sugar cane to the Caribbean. The Spanish then initiated the beginning of the West Indian sugar plantation era in the islands of the Greater Antilles (including Cuba and Hispaniola, the latter now Haiti and the Dominican Republic) in 1506. But they soon found that more manpower was essential. In Europe it had long been common practice to employ slaves – by now mainly black but still a few white, many of whom were purchased at the Black Sea market at Caffa. Now the Spaniards decided to plunder the slave market but turned directly to the African Continent for its captive labour force. And

as Spanish interest was deflected to gold and silver, the Portuguese took over exploitation of the sugar plantations which spread to Brazil (over 350 there by 1623) and they also entered the slave market with vigour. Their justification for so doing appears to have been enshrined in part in an earlier Directive issued by the then Pope, their Christian leader. While Nicholas V (1397-1455) presided in the Papal Chair, after the abdication of Felix V (1383-1451) in 1449, he is understood to have ordered that

Saracens, pagans and other enemies of Christ' south of the
Mediterranean be brought to 'perpetual slavery'

– unless of course they became converts to the Christian faith. This was the beginning of the infamous Slave Trade with the Americas in which very many European nationals participated and which was to create unbelievable horror and misery for over three centuries. It was eventually estimated that the very smallest plantation needed 250 slaves and in those centuries roughly 10,000,000 slaves were involved – of which how many died *en route*?

Authorities suggest that the West Indies and Brazil were among the first regions to experience problems created by dependence upon the cultivation of only one crop. American settlers in the southern States and on the eastern seaboard of North America all took advantage of this situation. The plantations bought horses from New England to turn the rollers that crushed the harvested cane. Wood for the cabins and the sugar mills, and cereal and flour arrived from Baltimore and Pennsylvania. Meat and vegetables came from the Carolinas, Connecticut and New York. Even the British on the other side of the Atlantic took advantage of this by selling them food too. On the Brazilian plantations the slaves found themselves eating dried meat and Newfoundland cod, and in 1783 records show that Jamaican slaves (and others in the West Indies) were being fed bacon, tripe, salt pork and beef. No doubt all of this was at a price and certainly, for the recipients, the food would have been alien in nature.

It was in the early 18th Century that the sugar plantations spread to the North American mainland. But Thomas Jefferson (1743-1826, the 3rd President of the United States, predicted that ultimately these would be unprofitable when he informed a French correspondent that

... We have within the ancient limits of the United States, a great extent of country which brings the orange to advantage, but not a foot in which the sugar cane can be matured.

He was not speaking without personal experience as he tried out many different crops at Monticello, his Virginian estate – and eventually after the American Civil War in the 1860s he was shown to be correct. Sugar cane from the Southern States then proved to be uncompetitive in the world markets. The cane grown in the West Indies (and by then also in the Philippines) yielded a far higher sugar content per acre. The large Southern (North American) sugar plantations went out of business. One fascinating footnote – molasses and maple syrup continued to be the prime sweeteners in North America until the mid-19th Century as sugar was far too expensive. At that point the coarse brown muscovado (which was partially refined) began to dominate.

By now back in Europe sugar was more of a necessity – or even an addiction. Honey was no longer in great supply as for instance the monastery closures in Britain (in the 16th Century under Henry VIII) meant that fewer hives were being kept. (The monastery apiarists who had tended the majority had provided the ingredients for beeswax candles, as well as honey for sweetening.) And similar effects had occurred elsewhere on the European mainland following the Reformation. During this period also in about 1600 the Europeans learnt something that is believed to have been known by the Persians (and then the Arabs) for centuries before this. Sugar could be used like honey to preserve fruit.

And culinary knowledge was then to be extended further for the Continent as by 1730 it had also been recognized there that sugar could be used to make jam. By this time sugar was available in greater quantity, had reduced in price dramatically and was beginning to be a major world commodity. Its importance by 1670 had reached such heights that the Dutch were even prepared to cede New York to Britain in return for Surinam and her sugar plantations. In terms of currency and economics the 'sugar standard' was then to be recognized for 200 years until it was superseded by the 'gold standard'.

While access to sugar was limited European consumption was low. In France it had reached only 2.2 lb. per head in 1788. But the sweetener was nevertheless of sufficient importance that when the Napoleonic Wars (1792-1815) closed French access to American sugar, sugar beet (see *Beta vulgaris* subsp. *vulgaris*) began to be exploited in France, Germany and the 'Low Countries' as a substitute. In contrast Britain's dependence on sugar persisted into the 20th Century. The progressive acceptance of sweetened tea as a drink during the 18th Century, combined with the relative ease of access to the Caribbean for sugar supplies, no doubt fuelled the massive upsurge in sugar consumption in Britain that by the end of that Century was estimated to have increased 7½ times. Records show that in the 1980s (despite the proliferation of 'slimming' and 'healthy eating' campaigns) British sugar intake had reached 80 lb. per head and in North America it was even higher at 126 lb. per head.

Sugar cane in different forms grew in all the South Pacific islands, and authorities believe that the Polynesians introduced it to many places as a chewing medium long before Europeans appeared on the scene. It had been growing in Hawaii before Captain James Cook (1728-1779) arrived there in 1779 sadly to meet his death. By then unsophisticated attempts to cultivate cane sugar were already being made there and it was quite normal for Hawaiians to carry short pieces of cane as concentrated provisions on long land or sea journeys. In addition to food and medicine these Islanders used the leaves for embalming and for thatching. Although desultory attempts were made to establish a Hawaiian sugar industry in the early 1800s, it was not until mid-Century that one effort in particular proved to be successful. But it was probably the 1849 Californian Gold Rush that determined Hawaii's future to a large extent, as well as the emergence of sugar as an important export commodity for the Islands' economy. The Hawaiian population had dwindled (partly because of the numbers who were serving on whaling fleets) and there was widespread shortage of labour that afflicted all plantations not just the sugar cane. Then Hawaii took her first steps in the establishment of a multi-ethnic community. In 1852 coolies arrived from China and their industrious contribution led to the need for more outside help. The Chinese were followed by Polynesians (who were not found to be quite so hardworking) and then the Japanese. These immigrants were to be succeeded in later years by many more nationalities including Europeans. Sugar exports continued to increase and increase, not least because the United States agreed in the reciprocity treaty signed in 1876 to permit the entry of unrefined sugar from Hawaii duty free. (Today many of the sugar fields have been abandoned and authorities note that these are evolving into an unusual ecosystem there as they tend to be dominated by invasive introduced species of trees from all over the world.)

In the Orient sugar cane has been useful in many ways. Some of those not already mentioned include the use of the crushed cane in China as pig food. Also the wax on the canes (which is similar to that obtained from the wax palm, *Copernicia prunifera*, and is harder than beeswax) has been harvested commercially. In Malaysia sugar cane has also played roles in various local rituals, some to do with childbirth and others the cultivation of rice (*Oryza*).

Sugar was introduced to Australia with 17th Century settlers. Here again imported slave labour was used to man the plantations only these slaves came primarily from the Pacific Islands. Although they were far healthier than most of the Africans who reached the Caribbean, Brazil or the southern North American states they did bring some tropical infections with them, notably malaria. This became established in Queensland but after the Government temporarily banned further immigration and the plantations started to observe basic rules of sanitation, the malaria was overcome. Today the State has a name for being the healthiest area in the world.

In recent years after controlled fermentation sugar cane has begun to be used as a source of fuel as part of the widespread search for alternatives to fossil fuel. An example of this is shown in Brazil where since 1975 the cane has been cultivated under a National Alcohol Programme. (By 1986 half the cars in Brazil were running on ethanol.) But as large areas of rainforest were laid waste for these cane fields at the beginning of this Programme the exercise has been a significant contributory factor in the devastation of rainforest and river pollution from the accompanying sludge. At the turn of the 20th and 21st Centuries the cane fields were beginning to be replaced with cassava (*Manihot esculenta*) which is being used for the same purpose and is likely to be less environmentally destructive. These experiences however did not deter continued interest elsewhere in sugar cane as a source of fuel. By 2002 a non-toxic, environmentally friendly, organic fuel in the form of a gel had been developed from the cane. It was used as cooking fuel for the dishes served to international delegates at the 2002 South African Earth Summit and shortly afterwards was being promoted in the West for heating greenhouses (as an alternative to paraffin in common use).

Another perhaps unexpected use of sugar cane is the manufacture of paper. This can be made from 'bagasse', the residue left when sugar has been extracted from the stems.

A term relating to sugar that was once in popular use was 'sugar baby'. This assumes an ugly connotation when it is appreciated that children brought up on a diet of sugar in the West Indies and who thus suffered severe malnutrition, were called 'sugar babies'.

The famous English dramatist, William Shakespeare (1564-1616), makes innumerable references to sugar in his plays. For example in *As You Like It* he wrote

.....unless thou wert hard-favour'd, for honesty coupled to
beauty, is to have honey a sauce to sugar.

and in Part 1 of *Henry VI*

By fair persuasions, mix'd with sugar'd words,
We will entice the Duke of Burgundy
To leave

Sugar cane is depicted in the coat of arms of Fiji, and St. Lucia in the Caribbean.

With tangerines (*Citrus reticulata*), peanuts (*Arachis hypogaea*) and yam bean (*Pachyrhizus erosus*) it plays a significant role in the Mexican Festival of the Dead which takes place annually on 1st November.

It has not as yet been mentioned that the distillation is used by the drinks industry eg. rum and the remains of the canes after extraction provide a commercial fodder.

Medicinally, sugar cane juice has been used in the West Indies to treat cataract and it has been recommended as a heart tonic.

See Also Sugar beet (*Beta vulgaris* subsp. *vulgaris*).