



SUGAR

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CULTIVATION, MANUFACTURING AND PROCESSING

The production and processing of sugar (NPers. *šekar*, from Skt. *śárkarā*, “ground or candied sugar,” originally “grit, gravel”) was already known in Sasanian Persia around 460 CE, and the Chinese ascribed the invention of the process of the refining of sugar syrup into hard sugar to the Sasanians (Laufer, *Sino-Iranica*, p. 376). The 9th-century Zoroastrian text *Zādspram* as well as Muslim authors from the early Islamic period, such as Qazvini and [Biruni](#), mention that at *Nowruz*, in the morning before speaking, one ate white sugar. According to Biruni, the discovery of sugar was also believed to have happened on *Nowruz*. The legendary king Jamšid discovered the sugar cane accidentally while riding during *Nowruz*. Once he realized how tasty and sweet it was, he ordered its production (Christensen, II, pp. 100, 147; for other uses of sugar in social and political life see Floor, 2003b), p. 330-32).

Sugar was produced from cane (*kuz*), which is of Southeast Asian or Indian origin. In pre-Islamic Persia, sugar cane was grown in Makran, Khuzestan (literally “land of the sugar cane”), Balkh and Mesopotamia, where it continued to be grown during the Islamic period. Makran’s chief product was *panid* or *al-fanid*, a kind of white sugar, which was exported to neighboring countries. Sugar was mainly grown in Khuzestan, in particular at Susa and [Gondēšāpur](#). In fact, all the red and white sugar (*šekar*) and refined sugar (*qand*) of the world came from [‘Askar Mokram](#) in Khuzestan, or so it was



claimed (Spuler 1952, p. 388). Even as late as the 14th century, the Masrukan district in Khuzestan produced sugar cane, while Gondēšāpur was still famous for its sugar cane (*Nozhat al-qolub*, ed. Le Strange, pp. 109, 236, 238). However, after the beginning of the 14th century, sugar cane cultivation in Persia fell off due to the destruction and neglect of the irrigation dams, as well as the drainage systems, in Khuzestan, following the Mongol invasion and its aftermath, and henceforth Persia had to import most of its sugar (Wulff 1966, pp. 242-43).

Henceforth, India became Persia's supplier of sugar, both via the land and the maritime route. It was only with the entry of the Dutch into Persia in 1623 that the dominant role of Indian sugar came to an end. In addition to Indian sugar, sugar from Formosa (Taiwan) was imported. After 1662, when the Dutch lost Formosa, they began to import sugar from Java. The latter variety came to dominate the Persian sugar market as of 1680, and this continued to be the case till the end of the 18th century. Sugar from India, as well as from Oman, continued to be imported (Floor 2000, pp. 126-33; 1982, pp. 197-213; 1992, pp. 441-60).

Sugar from India dominated the Persian sugar market again in the 19th century (Milburn, I, p. 123). Sugar was the second most important import article for the Persian market, and this ranking would not change during the entire Qajar period, although its relative size doubled. By the end of the 1840s, raw sugar in Isfahan came mainly from Java; its sugar candy was mainly from China and Bengal (Amanat, pp. 101, 112-13). Java sugar had slowly ousted Bengal sugar from the southern market by the 1860s. But as of 1865, Dutch sugar was entirely replaced by sugar from Marseilles in the Tabriz market (Government of Great Britain, House of Commons, Parliamentary Papers, 1865, p. 269). French sugar continued to play a leading role for a decade, until it was, in turn, replaced by Russian sugar. Imports of Russian sugar into the north of Persia had begun seriously as of 1880. In 1888, Russian sugar (99%) had all but ousted French sugar (1%) from the Tabriz market, and French sugar disappeared altogether in 1889 from the market in northern Persia (Government of Great Britain, *Diplomatic and Consular Reports* [henceforth *DCR*], Annual Series, no. 611, p. 1).

In 1890, the consumption of sugar in Tehran was estimated at 10.6 tons per day or 3,800 tons per year. However, this figure was believed to be probably higher, if it was assumed that Tehran had a population of 200,000 and a daily consumption of 60 grams per person, which would result in a consumption of

12 tons per day or 4,300 tons per year. If the population of the villages surrounding Tehran who did their purchases in the city were added then the total annual consumption was about 4,500 tons. Of this, two-third was represented by loaf-sugar. In 1898, sugar consumption was even estimated to be 37.5 kg per person, or 70% higher. Both estimates were clearly too high, given the fact that the population of Tehran only reached the 200,000 level by 1920 (Ministerie van Waterstaat, Handel en Nijverheid, p. 27; Nationaal Archief, 15 July 1898). Other estimates were even higher (see e.g. Lorini, p. 161, cf. tr. in Issawi, p. 307).

About 1890, sugar consumption in Persia was estimated to be as follows: (a) loaf-sugar or *qand* was the main article consumed. The sugar loafs were imported from Marseilles (double refined loafs of 2.258 kg) and Russia (Kiev, Odessa, Kharkov) with double refined small (2.775 kg) and large loafs (13.4 kg). One of the reasons that French sugar could compete with the Russian sugar was that it dissolved must faster. In southern Persia, therefore, French sugar was almost exclusively used. Small loafs of 2-3 kg were used (and re-used) as presents. They also obtained higher prices than the large loafs of the same quality; (b) soft sugar, also referred to as crystal or granulated sugar (*šekar*), came in all kinds of forms, in particular of the French so-called “no. 3 type”; and (c) candy sugar or *nabāt*, which was manufactured locally. *Šekar* and *nabāt* were both used for the manufacturing of syrups, sweetmeats, confectioneries, bonbons, etc. (On the making of sweetmeats see Floor 2003b, pp. 360-70).

Those segments of society that could not afford to buy sugar, made do with honey, dates, raisins or other, mostly wild, plant products as a sweetener (For a discussion of some of these other plants see Floor 2003b, pp. 370-75; 2003a, pp. 286-334, 581-83).

Whereas in northern and central Persia only Russian sugar was consumed after 1889, in southern Persia various countries competed for the market. Initially, French sugar dominated in the south and Russian sugar was only consumed in Isfahan, if there was no French or Mauritius sugar available. Although there was some import of Russian “moist-sugar,” most of it came from Mauritius or Marseilles, which were appreciated because of its higher sugar content. In Isfahan, there were 12 sugar-works, which refined Mauritius and Marseilles sugar, and the refined final product was the most sought after by the consumer (Government of Great Britain, *DCR*, Annual Series, no. 1662, p. 19). French sugar was imported in cones of 1.7 kg and 1.6 kg, respectively.



Nearly all loaf sugar brought for Persian consumption was marketed in cones of about 11 inches height, wrapped in dark-blue paper, and with a round black label in the center inscribed in gold. The cones were brought in cases and bags (Government of Great Britain, *Trade Report of Bushire for 1915 to 1916*, pp. 9-10). It had to compete with, for example, Austrian-Hungarian soft or crystal sugar. Another competitor was Germany, which also tried to get a share in the market. One particular German sugar variety was only appreciated in the Persian Gulf coast districts. Austrian and Marseilles sugar was driven from the market by Belgian sugar, which was marketed as of 1900 in the Gulf (Government of Great Britain, *Trade Report of Bushire for 1915 to 1916*, p. 9). The tendency in the market was to still further lower the weight of the sugar cones, though they conformed as far as possible to the shape and size of the Marseilles cone. Therefore, importers asked to lower the 1.7 and 1.6 kg cones to 1.55 kg (Government of Great Britain, *Trade Report of Bushire for 1910 to 1911*, p. 12).

After cottons, sugar was the most important import commodity, and was estimated to represent 24% of total imports in 1910 (see [TABLE 1](#) and [TABLE 2](#)).

Consequently, many countries competed for this market; mainly Russia, France, Belgium, Germany, and Austria dominated the market. Of loaf sugar, which constituted 85% of imports, Russia had a 80% market share, or 71 million *qerāns* (In 1912, about *qerāns* equaled 100 French Francs) in 1907-08 (Government of Great Britain, *Trade Report of Bushire for 1911 to 1912*, p. 12; Entner, p. 72, table 13). Because of World War I, Persia also imported, in addition to Egyptian sugar, refined sugar from Hong Kong, as well as from Mauritius and Java, in order to replace sugar from Russia that was not available anymore (Government of Great Britain, *Trade Report of Bushire for 1915 to 1916*, p. 9).

Cultivation. After 1400, only in Mazandaran some sugar cane or *ney-šekar* (*šekar-e luleh* in Gilaki) was still being produced. Around 1770, the Russian traveler Gmelin mentions the production of sugar cane in various districts of Mazandaran, such as Rudisar, Barforuš, Nur, [Āmol](#) and Ašraf (see [BEHŠAHR](#); Gmelin, III, pp. 461-62, 477; Fraser, pp. 86 and 371; as to cultivation see Holmes, p. 154).

In 1851, [Kānlar Mirzā Ehtešām-al-Dawla](#) was instructed to take sugarcane from Mazandaran to Šuštar and plant it there in the 'Oqayli district (*Ruz-nāma-*

ye waqāye'-e ettefāqiya, I, p. 297 [28 Rabi' al-tāni 1268/20 February 1852]; E'temād-al-Saltāna 1884, p. 119; 1989, I, p. 693, on the experiment of 1861; II, p. 1118, on the experiment of 1851]. The sugar cane experiment did not succeed and was abandoned. Āqā Moḥammad-Mahdi *Arbāb*, one of the leading merchants of Isfahan also made an effort to cultivate sugar cane in Isfahan. However, he was not able to produce sugar of a quality comparable to that of India, because he lacked the know-how, and thus he abandoned the project (Najm-al-Molk, p. 177; Taḥwildār, p. 58). Similar experiments were carried out with the cultivation of sugar beets. In the 1830s, Malek Qāsem Mirzā, the governor of Orumiya, tried an unsuccessful experiment on a small scale with sugar-beets (Perkins, p. 328). Another similar experiment was tried in the 1850s by a Tabrizi industrialist (Blau, p. 81).

Mazandaran sugar was mostly consumed in the province itself. The peasants chewed fresh cane continuously, and also ate it with their bread and rice. A considerable portion, however, was exported to Gilān, and some to Russia and Astarabad. However, export diminished over time, and by the turn of the century had been reduced to a very small quantity. In 1891, only some 2,165 puds (Russ. unit of weight: 1 pud = 16.38 kg) and in 1892, as little as 948 puds of Mazandaran sugar were exported to Russia. By 1870, the cultivation of sugar cane was not limited to Mazandaran anymore. For in that year some 17,000 *mann* (either referring to the *mann-e Tabriz* (2.9 kg) or the *mann-e šāh* (5.8 kg)) of sugar was produced in Gilān, which did not need to import sugar from Mazandaran any longer (Government of Great Britain, *DCR*, Annual Series, no. 4398, 1910, p. 30; Government of Great Britain, House of Commons, Parliamentary Papers, 1872, p. 1188; Lafont and Rabino, p. 237).

Refining. Candy sugar (*qand*, *nabāt*) continued to be refined in sugar-mills (*qannadi*) around the country using imported, but less sweet, refined sugar (*šekar*), and turning these into sugar loves (*kalla-qand*) and other sweet-meats (Floor, 2003b), pp. 328-75). The sugar produced in some cities was quite well-known beyond the confines of their walls or even provincial borders. This held true for Isfahan, but above all for Yazd. Part of the sugar import into Yazd was refined locally and “made up into small cubes to meet a religious prejudice; it is then known as *āb-e pāk* (literally “clean water,” but in reality expressing the fact that it has been refined by clean believers, as against unclean infidels). This accords employment for a number of people” (*DCR* 525, “Report on the Trade of the Districts of Ispahan and Yezd for the Year ending March 20, 1913,” p. 57). As a consequence, among the religious portion of the



population of Persia, Yazd sugar had a large demand, because it was known, that in the refining nothing of an unclean nature was used. In 1893, there were fifteen of these refineries in Yazd, which continued to operate till the end of the Qajar period (Government of Great Britain, *DCR*, Annual Series, no. 1376, p. 20). The efficiency of the sugarcane refining process in Mazandaran was estimated at 20%-35% (Lafont and Rabino, pp. 238, 241 [with a detailed description of the process]; see also Floor 2003b, pp. 347-49; MacKenzie, pp. 74-75). On sugar-mills in Persia throughout the ages see Moḥebbi, pp. 151-61).

Modern factories. In 1851, Karbalā'i Aḥmad was sent to Moscow to learn the craft of making sugar and *qand*. On his return, Ḥājj Mirzā Moḥammad Tājer established a sugar-mill (*šekar-rizi*) at Maydān-e Arg at Šāri, while another one was founded at Bāḡ-e Šāh in Barforuš, which refined Mazandaran sugar and produced refined granulated and lump sugar, which allegedly was even better than very good Indian sugar (Ādamiyat, pp. 385-86; E'temād-al-Saltāna 1989, II, pp. 1132, 1184, 1390; MacKenzie, p. 93).

The sugar refinery failed, chiefly because the producers were forced to deliver moist sugar without payment, according to Polak (II, p. 185). Despite the failure of the sugar mills in the 1860s, there was renewed interest in sugar-mills in view of the growing imports of the commodity. In 1890, [Amin \(-e Dār\) al-Ẓarb](#) decided to establish, *inter alia*, a sugar-cane press in Maḥmudābād, but this was never completed. The machinery was left to rust in the ruined railway station of the town (Rabino, p. 447). Around 1890, Belgian investors made a financial analysis, which showed that the rate of return on an investment in a sugar factory, -which would make loaf sugar, crystallized sugar, and sugar candy, would be very profitable. The modern sugar factory at Kahrizak began operations in 1895/96, but was closed down in 1899/1900 due to the high cost of the raw materials and unexpected high expenses. Coal was more expensive than estimated and its supply and quality unreliable. Moreover, landowners were unwilling to plant sugar beets at prices that the sugar-millers offered. Another issue was the need to add lime to the sugar juice, but it was difficult to find good raw materials locally to be used in the process (Issawi, pp. 307-08; Lorini, pp. 161-63).

This was the end of the various private sector attempts to build modern sugar-mills in Iran based on the development of large-scale cultivation of sugar-beets. This effort would be resumed again in 1932, when in the same factory of Kahrizak, sugar-milling was resumed. This time the effort was crowned with success and seven other sugar-mills followed. However, this time the political

and economic context was also different (Floor 1984, p. 30). Sugar refining had become a state monopoly and was done at seven factories, employing 4,200 workers, using sugar-beets as raw material. The output was 34,000 metric tons. In 1948, Iran still imported much of its needs through the International Emergency Food Council, but thereafter it was on its own and was exposed to the vagaries of the world market (Roberts, pp. 18, 21). Annual consumption was about 135,000 tons, of which 67% was imported. It dominated imports, representing 22% of imports in 1946 and 12% in 1947. Production and marketing of sugar was a state monopoly. In most cases, by-products (molasses and pulp) were wasted rather than used, for example, as fed for cattle of which there was a deficit. Under the Seven-Year Plan, more efficiency, as well as new factories would be introduced, including those using cane which was going to be cultivated in Khuzestan (Overseas Consultants, Inc., IV, pp. 156-60). In 1950, five new state-owned mills were built. The industry grew, despite increasing imports, because of the state monopoly and rising demand (TABLE 3).

The factories were not very cost-competitive. Their cost depended on the availability of beets and their technical efficiency. The length of the milling season varied. In 1936-37 it was between 24-55 days and in 1956-57 between 59-164 days. This required significant improvement as well as the better use (animal feed) of by-products as pulp and molasses that used to be dumped, used as fertilizer, or burnt as fuel (Agah, pp. 230-31). Another seven private sugar mills were built in the 1960s. Iran produced both beet sugar and cane sugar by the 1970s. Sugar beet is an irrigated crop and was mostly cultivated in Khorasan (45%), Fārs, Isfahan, and Azarbaijan. Productivity per hectare remained low (14-18 tons) due to inefficient traditional cultivation methods. Increase in output was mainly due to increase in area. Sugar cane was reintroduced in Khuzestan and a state-owned sugar-mill (*Haft Tepe*) with a capacity of 3,000 tons per day was operating by 1975. Beet sugar output still represented 90% of sugar production at that time, however (Aresvik, pp. 75-76).

The annual consumption of sugar in Iran increased rapidly during the 1970s due to the growth in population and income. Consumption increased from around 650,000 tons in 1970 to 1,100,000 tons in 1980, resulting in a per capita sugar consumption of almost 30 kg per year. In the 1990s, the annual per capita sugar consumption was about 25 kg and total consumption was kept at 1.5 million tons per year through the quota system. It is expected that on



average, 60,000 tons sugar will be added to annual consumption of sugar given current consumption trends. In the 1980s, sugar production had dropped by one-third. Therefore, beet and cane production had to be increased and new milling capacity added, so that in 1998, some 5.5 millions tons of beets were produced, mainly in Kermanshah and Fārs. There were 25 sugar-mills, together having an output of 750,000 tons of beet sugar, and by 2000, five other mills were added with an additional production capacity of 140,000 tons. In the late 1980s, some 1.8-2.5 million tons of sugarcane were produced in Iran, resulting in an output of 180,000 to 250,000 tons of cane sugar. Also, some 400,000 tons of molasses were produced in Iran, from which alcohol, yeast, and single cell proteins were made (see Iranian Information Centre of Food and Agriculture Trade). In 2000, Iran's president Khatami [Sayyed Moḥammad Kātami] declared that with the full commissioning of the latest sugar-cane project in Khuzestan (Miān-e Āb), Iran would be able to even export extra sugar. However, a net-sugar surplus seems to be as yet an unattainable target. According to the latest available UN statistics, the import-export situation of sugar products in Iran in 1997 (in million US dollars) is shown in [TABLE 4](#).

The International Sugar Organization (ISO), which Iran joined in April 2002, reports that Iran is the seventh largest producer of beet sugar. Total sugar output was 0.92 million tons in 2000. In that same year, Iran still imported 0.65 million ton of raw sugar and 0.24 million tons of white sugar.

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