Published: December 15, 2000
Last Updated: June 1, 2013

GAZ (1) I. GAZ-ANGOBĪN

i. GAZ-ANGOBĪN

A. adscendens (*gavan-e gazī*) is a very prickly, grayish-green, perennial shrub which grows up to 1 m in height, with diagonally ascending branches culminating in a flat crown 1 m or more in diameter. Indigeneous to the mountains southwest of Isfahan in central Persia, it was collected by Karl Haussknecht in 1870 and classified by Edmond Boissier in 1872 (II, p. 317; Ṭābetī, p. 42). It is the source of *gaz-angobīn*, the sweet exudate used to produce the popular Iranian confection known as *gaz*. The exudate is sometimes also referred to as *gaz-e Ḵᵛānsār*, after a town in the producing area.

While the history of *gaz-angobīn* dates back centuries, the consensus on its origins has, until recently, been split between those who saw it as the product of an insect and those who believed it to originate from the plant itself, like certain other mannas. The Persian scholar Bīrūnī (q.v.) has been cited as the earliest authority to refer to a manna-producing insect on a spiny plant species (apud Meyerhof). A historical survey by R. A. Donkin in 1980 shows that *gaz-angobīn* was noticed by western travelers during the 18th and 19th centuries. Other travelers reported that, according to local opinion, *gaz-angobīn* was an insect product (Gmelin, IV, p. 288; Malcolm, II, 526 n.). Captain Edward Frederick, a traveler to Persia in 1813, made the following comments regarding his experiences with *gaz-angobīn*: “The shrub on which the gez is found is called *gavan* with a striking resemblance to the broom,□and underneath we saw the gez spread all over the tender branches like white

uneven threads, with innumerable little insects creeping slowly about. These little creatures appeared to derive their subsistence from the leaves and young bark of the bush they inhabit. The inhabitants of Kunsar were decidedly of opinion that this curious substance is the production of these diminutive animals, as neither the insects nor the gez are found on any other tree in the neighborhood; I looked upon [*gaz*] as unquestionably an animal production." However, Mīrzā Jaʿfar Ṭabīb, a Persian physician residing in London in 1819, referring to Frederick's conclusions, commented that *gaz* was the name of trees that supposedly belong to the genus *Tamarix*, and that "it is the universal opinion in Persia that all these varieties are exudations from the trees on which they are found, and not the work of insects" (Tabeeb, p. 268). Frederick's findings were not generally accepted for another 150 years.

Gradually, observers became aware that *gaz* was indeed the product of the insect, with *A. adscendens* simply acting as a host. M. Ṣāneʿī and M. Esmāʿīlī visited the site in 1980 and reported that "the insect, in its nymphal stage, exudes a soft, colorless, thread-like substance from the anus onto the plant" (p. 1). They indicated that a detailed study of the insect was necessary to improve understanding of the process of *gaz* production. A. Naʿīm and E. Behdād (1988) subsequently investigated the biology of the insect in Ḵᵛānsār. They identified the insect as *Cyamophila dicora* Loginova and provided information on its life-cycle and morphology: Its eggs are placed in tandem alongside the main vein of fully-grown leaves, which then curl up around the vein. The nymphs begin feeding inside the rolled-up leaves before they are scattered over the plant during flowering. They can be seen between the sepals and petals, but not inside the corolla. The white, sticky, segmented strings of *gaz* are mostly secreted in the last instar stage. The segments indicate multiple excretions. The soft exudates harden, eventually detach from the nymph's body, and remain in the foliage, mixed with the nymphs and often with the plant debris as well. The insect completes one generation in a year. In 1993, however, in a thorough review of the jumping plant-lice of Iran by D. Burckhardt and P. Lauterer, the *gaz*-producing insect was classified in the family *Psyllidae*, subfamily *Arytaininae*, and the genus *Cyamophila* (p. 833). Burckhardt and Lauterer's study indicated that the specimens previously identified as *C. dicora* by Naʿīm and Behdād show the characteristic, entirely brownish forewings of *C. astragalicola* Gegechkori, while the forewings of *C. dicora*, by contrast, bear distinct apical brown patches. They therefore identified the *gaz*-producing insect as *C. astragalicola*.

The gathering of *gaz-angobīn* may begin in late August and continue until mid-October, depending on location and weather. The methods of its collection have remained unchanged for at least two centuries. Frederick wrote in 1819, “The men were furnished with a stick three-fourths of an inch in diameter and curved at the further extremity, which was covered with leather, and a kind of oval leathern bowl nearly three feet long and two broad with a handle to it, resembling an egg-shell cut in two longitudinally. Besides these, they had a sieve suspended from the right side, to free the gez from the insects and small pieces of leaf that generally fall with it when first beat from the bush. The bottom of the sieve was of coarse woolen cloth” (p. 255). The stick for beating the bush, which resembles a tennis racket, is locally called *arbeh-kūdī*. The oval collecting bowl is made of processed goat or sheep skin stretched over a wooden frame and is locally called *seyleh*. The gatherer holds the *seyleh* under the branches, strikes them rather gently with the stick and catches the tiny, threadlike *gaz-angobīn* particles, along with some plant debris and insects, in the *seyleh*. Then, he passes the material through the sieve and separates the *gaz* from the rest.

When the *gaz* of Ḵᵛānsār was abundant in the past, plants could be visited several times at intervals of a few days. During September, it was collected every third day; if repeated more often than that, the insects would become exhausted (Frederick, p. 256). While in the past one shrub could yield up to 20 or 30 grams of *gaz-angobīn*, in recent years it might require dozens of plants to yield that quantity. Since the egg-bearing leaflets fold lengthwise and form tubes, some gatherers have learned how to use them to make predictions about the *gaz*-producing capacity of plants a few weeks before the gathering season.

The plant is virtually an unlimited food source for the insect. The plant density is sufficiently high and not much footwork is required by the *gaz* gatherers. Seasonal fluctuation in the population of the insects, however, has a direct effect on *gaz-angobīn* production. Ṣāneʿī and Esmāʿīlī (p. 4) suggested that, early in spring, adult insects be transferred from high to low population areas, and the insects and seeds collected on the sieve during collection be carried in paper bags to the areas of lower *gaz-angobīn* production. Rainfall and strong wind during the collecting season will also have adverse effects on *gaz-angobīn* collection.

Iranian researchers have investigated the physico-chemical properties of *gaz-angobīn* (Nīk-nežād; Āʾīnačī, Nīk-nežād, and Ṣāneʿī; Hāšemīya Anārakī, table 2).

It is free of nitrogen, sulfur, tannin, alkaloids, and halogens (Br, Cl, I). A 1 percent water solution has a pH of 5.5 and rotates polarized light to the right. *Gaz-angobīn* is originally white or cream-colored, while it may seem greenish or brownish-yellow in bulk depending on impurities. It is hydrophilic, soft, and very sticky under normal conditions, breakable when dry, and readily soluble in water and alcohol. *Gaz-angobīn* is very sweet due to its high fructose content, about 40 percent, comparable to honey (Crane, p. 398).

Gaz-angobīn has been produced locally and consumed nationally in Iran for centuries. Demand for this substance considerably exceeds the available supply. Taking advantage of the increased knowledge about it in recent years and adopting recommended practices should help increase the production of this popular sweet substance. Some major recommendations include protecting *gaz*-producing areas from grazing animals, controlling the natural enemies of the *gaz*-producing insect, keeping bee activities away from *gaz* plant communities, and granting the rights of *gaz* collection to the local inhabitants.

PLATE I. *Astragalus adscendens* Boiss and Haussk, *Leguminosae*.

PLATE II. *Gaz* plants at the foot of the Ḵᵛānsār hills. Gaz gatherers can be seen in the background.

PLATE III. *Gaz* gatherers with their tools at the foot of the Ḵᵛānsār hills.

PLATE IV. Gathering *gaz*: tapping the plant and collecting *gaz* in the leather bowl.

BIBLIOGRAPHY

Y. Āʾīnačī, A. Nīk-nežād, and M. Ṣāneʿī, “Gaz-e Ḵonsār: manbaʿ-e ḡanī-e frūktūz/Gaz of Ḵunsar: A Rich Source of Fructose,” *Majalla-ye Dāneškada-ye dārūsāzī, Dānešgāh-e Tehrān/Journal of College of Pharmacy of the University of Tehran* 8, 1976, pp. 3-8.

E. P. Boissier, *Flora Orientalis*, 5 vols., Geneva and Basle, 1872.

D. Burckhardt and P. Lauterer, “The Jumping Plant-Lice of Iran (*Homoptera, Psylloidea*),” *Revue Suisse de Zoologie* 100, 1993, pp. 829-98. Chardin, III, pp. 295-96.

E. Crane, *Bees and Beekeeping: Science, Practice, and World Resources*, Ithaca, N. Y., 1990, p. 389.

Curzon, *Persian Question*, II, p. 502.

R. A. Donkin, *Manna: An Historical Geography*, The Hague and Boston, 1980 (with extensive references to mentions of *gaz* in European travel literature).

E. Frederick, “Remarks on the Substance called Gez or Manna found in Persia and Armenia,” *Transaction of Literary Society of Bombay* 1, 1819, pp. 251-58.

S. G. Gmelin, *Reise durch Russland zur Untersuchung der drey Naturreiche* III: *Reise durch das nördliche Persien…,* St. Petersburg, 1774, pt. 4, p. 288.

B. Grami, “Gaz-e Kᵛānsār,” College of Agriculture, Isfahan University of Technology, 1981, pp. 1-21.

Idem, “Gaz of Khunsar: The Manna of Persia,” *Economic Botany* 52, 1998, pp. 183-91.

A. Hāšemīya Anārakī, “Barrasī-e šīmīāʾī-e mawādd-e ālī-e ḡayr-e qandī-e gaz-e Ḵonsār/ Non-Saccharide Organic Compounds in Gaz of Khunsar,” Ph.D. diss., College of Pharmacy, University of Isfahan, 1976.

J. Malcolm, *The History of Persia*, London, 1815.

M. Meyerhof, “The Earliest Mention of a Manniparous Insect,” *Isis* 37, 1947, pp. 31-36.

M. Ṣāneʿī Šarīʿat-panāhī and M. Esmāʿīlī, “Gozāreš barrasī-e masʾala-ye gaz-e Ḵonsār dar ostān-e Eṣfahān,” Tehran, Mehr 1359 Š./1980 (hand-written report to the Faculty of Agriculture, University of Tehran).

ʿA. Naʿīm and E. Behdād, “Barrasī-e zīst-šenāsī-e pesīl-e gaz (Cyamophila dicora Loginova) dar marāteʿ-e Ḵonsār/The Biology of ‘Gaz Psyllid’ in Iran,” *Našra-ye āfāt o bīmārīhā-ye gīāhī/Applied Entomology and Phytopathology* 55, 1988, pp. 111-21.

Schlimmer, p. 358. Mirza Jiafar Tabeeb (Mīrzā Jaʿfar Ṭabīb), “Gezangabeen, or Persian Manna,” *Asiatic Journal* 7, 1819, p. 268.

A. Nīk-nežād, “Mannhā-ye Īrān/The Mannas of Iran,” Ph.D. diss., College of Pharmacy, University of Isfahan, 1976.

Ḥ. Ṯābetī, *Deraḵtān o deraḵtčahā-ye Īrān*, Tehran, 1344 Š./1965.