



GUM HISTORY - GUM ARABIC



The uses of Gum Acacia date back about 5000 years to the time of the ancient Egyptians, and it is the oldest and best known of all the natural gums. Among its many ancient applications, Gum Acacia was used as

a binder in cosmetics and inks, and as an agent in the mummification process.

Egyptian fleets shipped Gum Acacia as an article of commerce. Ancient inscriptions frequently refer to "KAMI", a form of Gum Acacia used as a pigment binder and adhesive in painting. It was eventually introduced to Europe through various Arabian ports acquiring the name "Gum Arabic" after its place of origin.

During the Middle Ages, Gum Acacia trade was carried on through ports controlled by the Turkish Empire, thus giving rise to the name "Turkey Gum". An export trade was also developed for a time around Bombay – thus, "East Indian" or "Indian Gum".

Gum Acacia senegal is defined as the dried exudate obtained from the stems and branches of *Acacia senegal* (Wildenow) or the related species of *Acacia* (Fam. Leguminosae). It consists mainly of high molecular weight polysaccharides and their calcium, magnesium and potassium salts, which on hydrolysis yield arabinose, galactose, rhamnose and glucuronic acid.

Three principal fractions have been identified in Gum Acacia senegal:

Arabinogalactan -- 88% of the molecule and approximately 15% of the polypeptide fraction

Arabinogalactan-protein complex – 10% of the molecule and nearly 50% of the polypeptide

Glycoprotein – 1% of the molecule and again nearly half of the polypeptide fraction.

Currently over 70% of the world's supply of Gum Acacia is produced and exported by the Sudan. More than two different distinct species of acacia occur in the Sudan but the majority of the commercial gum comes from *Acacia senegal* and *Acacia seyal*. The other major supplying areas are Chad and Nigeria. Gum Acacia has also been sourced, although in small quantities, from Senegal, Mali, Mauritania, and Niger.

Strangely, Gum Acacia is only produced by trees that are in an unhealthy condition. Gum yields are improved by natural factors that lessen the vitality of the trees – hot weather, poor soil, lack of moisture, etc.

It is important to remember that a damaged tree will give a larger yield of gum. Thus, the natives will cut and strip the bark from a tree and return later to remove the tears of gum that form in the wounds or scars. Within 3 - 8 weeks, the gum will start to collect in the wound, but this depends on the weather conditions. Gum droplets are about 0.75 - 3 inches in diameter, and they gradually dry and harden on exposure to the atmosphere. A young tree will yield 400 - 7000g annually.

The dry season lasts from October to June and the gum is collected every 10 days. During the rainy season no gum is formed since the trees are in full bloom. After collection, the gum is brought from the farms and stands to villages. From there it's transported to market. In the Sudan, the gum is auctioned (under government supervision) and this usually sets the world price.

When the gum is auctioned, there is a basic cleaning process including sieving, hand selection and grading. The main purpose of this cleaning process is the removal of sand, bark, extraneous material and any adulteration with other gums



GUM HISTORY - GUM ACACIA SEYAL



Unlike the ancient Gum Acacia senegal the commercial use of Gum Acacia seyal is a very new and exciting development. An exudate of the Leguminosae family of tree, Acacia

seyal has only been commercially available in the United States since mid 1988. Prior to this it had commonly been used in its raw state as a confection in India. Although crude seyal had always been in abundant supply, in 1984 Importers Service developed the selection, purification and drying techniques to permit the manufacture of Spray Dried Gum Acacia seyal. Since these developments Acacia seyal has gained wide acceptance first in industrial applications and more recently in food and pharmaceutical applications for coatings, encapsulation, tableting and as a source of soluble fiber.

Acacia seyal is now available from several other sub-Saharan African countries, notably Chad, where it is called "Gum Friable", and Nigeria, where it is referred to as "Grade No. 2". It is interesting that A. seyal is not harvested in the same manner as A. senegal. Instead of tapping the tree to develop the gum tear, A. seyal is exuded through naturally occurring breaks or fractures in the tree branches and bark. Historically, the gum would generally go unharvested, fracture, fall to the ground and be rendered unsuitable for most food applications. Importers Service developed the manufacturing process that changed all that.

In the 1990's ISC developed methods to decolorize the naturally dark Acacia seyal without damaging any of the attractive natural properties it possesses. This has opened a new market for Acacia seyal - applications which require a white powder or colorless solutions, as opposed to the brownish solids or coffee colored solutions of the past. Importers Service's Superwhite Spray Dried Gum Acacia offers a less expensive but effective alternative for many of the other Acacia and starch based products on the market today.



GUM HISTORY - TRAGACANTH



GUM Gum Tragacanth, like Gum Arabic, has been in commercial use for well over 2000 years. Its name is derived from the Greek – tragos (goat) and akantha (horn).

Tragacanth comes in two forms – ribbon and flake. It is an exudate from the Astragalus genus of plants grown in the Middle East.

As with most gum exudates, Tragacanth exudes from wounds or breaks in the plants and dries as the ribbon or flake form. The gum is a complex

mixture of polysaccharides and is composed of two major components – a 60-70% water insoluble fraction called bassorin and a 30% soluble fraction of tragacanthin.

Mixed with water, tragacanthin yields a colloidal hydrosol. The bassorin fraction swells to form a gel. This swelling gives Gum Tragacanth the ability to form thick, viscous dispersions and pastes – ideal characteristics for preparing sauces and dressings, as well as pharmaceutical suspensions. A 1% solution can deliver viscosities of 3600 cps. Like Gum Arabic, Gum Tragacanth is an effective emulsion stabilizer. Compared to other gums, Tragacanth is fairly stable over a wide pH range as low as pH 2.



GUM HISTORY - GHATTI



Gum Ghatti, another plant exudate, is harvested mostly in India. Similar to Gum Arabic and Gum Talha, the exudate is formed as a protective sealant when the tree bark is damaged. It derives its name from its transportation routes – traveling through mountain passes or “ghats”.

Gum is harvested, sun dried and classified according to color and purity. Typically, 2-3 grades of Ghatti are available in the US. The No.1 Grade

is light in color with low levels of ash and high viscosity. Ghatti tears are processed mainly by grinding, although some work has been done on spray drying the soluble fraction. Only about 90% of the gum dissolves in water yielding a colloidal dispersion.

Structurally, Gum Ghatti exists as a calcium salt of a polysaccharidic acid. Ghatti acts as a natural buffer but will lose viscosity at high pH. Higher viscosities can be obtained by dispersing the gum in alcohol or increasing solution pH to above neutral. Aged gum dispersions also show increased viscosity. Gum Ghatti has good emulsifying properties.



GUM HISTORY - KARAYA



sap exudes and hardens. The gum is manually harvested and sorted for grade. Food grade Karaya must contain less than 3% bark and other organic matter. Like Ghatti, the gum is processed by grinding. Gum Karaya has been used commercially for only about 100 years.

Gum Karaya is the dried exudate of the *Sterculia urens* tree. Like Ghatti, Gum Karaya is sourced from India. As with Gum Arabic and Ghatti, the trees are "tapped" and the

Although a "water soluble" gum, Karaya, like Gum Tragacanth, does not dissolve in water but absorbs water to form viscous colloidal sols. Particle size of the powder determines the type of dispersion. Coarse particle size forms a discontinuous mucilage – the reason for its effectiveness in laxatives. Fine powders yield homogeneous dispersions with strong adhesive properties, therefore its use in dental adhesives.

Gum Karaya is an acetylated polysaccharide – L rhamnose, D galactose, and D galacturonic acid. Highest viscosity is obtained by cold hydration Vs hot hydration. Viscosity breaks down rapidly under heat. Gum Karaya also loses viscosity over time when stored in dry form under high humidity and temperature.