

GUAR GUM PROPERTIES AND APPLICATION

Badri Lal Nagar¹ and Homeshvari²**GUAR GUM:**

Plant exudates, or gums, are sometimes confused with rubbers, latex, and resins. In other words, gums are those materials that, when dissolved or dispersed in water, can create colloidal solutions or dispersions that are somewhat viscous. Since the dawn of civilization, gums-which are mostly composed of carbohydrates-have been utilized for a variety of reasons, including as ingredients in food (for both humans and cattle), for making pastries, and for the production of household goods. The gelling, thickening, and binding qualities of natural gums are among their well-known characteristics. A galactomannan, guar gum is a naturally occurring gum also known as **guaran**. It comes from the annual Leguminosae plant *Cyamopsis tetragonolobus* or *C. psoraloides*, which yield pods. It is a carbohydrate with a high molecular weight. It is odorless, white to yellowish white in color, and comes in a variety of viscosities and granulometry. The hull (14-17%), endosperm (35-42%), and germ (43-47%) make up the seed. Guar meal, which is high in protein, is

the germ and hull of guar seeds. The endosperm is the portion of the guar seed that is valuable commercially. Once the guar seeds have been dehusked, the ground endosperm of the beans is what is mainly used to make guar gum. After going through several industrial steps, guar gum powder is taken out of the guar seeds. The intended final product determines the production method.



After removing the pod, the dried guar seeds are crushed to remove the endosperm. The endosperms, fibrous portion, or husk, is extracted using polishing procedures. To obtain the ultimate powdered state, the polished, dehusked endosperms are then pulverized. Just before the crushing step of

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processing, heat treatment is applied to inactivate the harmful enzymes found de seed germs. The discovery of the sticky ingredient in guar crops, called galactomannan, gives them economic value. With minor yields are produced in the United States, China, Pakistan, and Africa, guar beans are mostly farmed in Australia and India. India accounts for 80% of global guar output, producing 1-2 million tonnes of guar yearly. The demand for industrial guar gum is around 45% of the total.

Composition of Guar gum

Constituent	Percent
Protein	3.5-4.0
Phosphorus	0.06
Ash	1.07
Water soluble polysaccharide	86.50
Water insoluble fraction	7.75
Alcohol soluble fraction	1.50

GELLING MECHANISM OF GUAR GUM

Guar gum can, even at low concentrations, generate a highly viscous solution. When dispersed in water, the mannose backbone's galactose side chains interact with the water molecules, causing the guar gum molecule to become entangled in its own chain in the aqueous phase. This development of viscosity in the solution causes it to gel or thicken. A rise in guar gum content leads to an increase in the degree of intermolecular chain contact, or entanglement,

which in turn causes an increase in viscosity and gelling. During the gel formation step, the water molecules round the guar gum molecule in a systematic manner. Guar gum gels more or less depending on the temperature. Because of the increased molecular mobility caused by energy dissipation, the gelling property decreases with temperature, and viscosity gradually recovers to its initial value when temperature is gradually lowered. As a result, guar gum's ability to gel is reversibly affected by temperature. The gelling mechanism is notably affected by the presence of salt. A decrease in viscosity and gelling occurs when there is insufficient water available for the full expansion of guar gum in guar solution containing salt. The total hydration of the guar gum in the solution is inhibited by the salt addition. The phenomena does, however, apply to high concentration guar gum solution.

Because of changes in the charge density and gum conformation, the addition of salt promotes the development of intermolecular aggregates in low concentration solutions. According to some accounts, the rupture of intra and intermolecular connections leading to the extension of chain conformation may be the mechanism producing this phenomena.

At present, guar gum is becoming more and more popular. Curing guar gum is also a promising future, with over 90% of the world's production and cultivation coming from India.

The need for this gum powder will only increase because it is utilized in mineral oil wells for shale drilling. This versatile gum can be found in ice cream, other baked goods, cosmetics, toothpaste, medications, and coils that repel mosquitoes. The first step towards increasing this guar gum cultivation is to set a golden aspiration of 25-30 thousand per quintal.

- ➔ This guar is produced without moisture. 4-5, or 3-4 weeks on average. The estimated cost of a plantation is Rs. 10,000. In Rajasthan, there should be between 20 and 30 lakh guar acres; nevertheless, throughout the past ten years, the area has grown by two to three times.
- ➔ It require 15 to 20 kilogram of seeds. Space rows 45-60 cm apart. Two plants are separated by 15 to 20 cm. Dry season is when this crop is grown. 7 to 7.5 kg/ha of yield.
- ➔ The best time to plant guar gum is often from July 15 to the first week of August. After rain, the ground is prepped for this by being ploughed in one or two layers. Cow dung works nicely for this crop.
- ➔ There are differences in the amount of gum in the seeds, the amount of gum mixed with the solution that thickens it,

and the length of time the crop is grown.

- ➔ This crop has to be given 1-2 weeds and 1-2 bullocks as needed during the growing season.
- ➔ After 40–50 days of crop maturity, falling occurs. The pods require 100–110 days to develop and begin to yield seed. Diseases like *Alternaria*, *Tambera*, *Bhuri*, and *Karpa* harm the guar crop. *Streptocycline*, water-soluble sulfur, and disinfectants containing copper are used as needed for this. One crop that is extremely pest-resistant is guar.
- ➔ The crop is harvested and threshed, meaning the seeds are cleaned and sorted by size, following a thorough drying of the guar gum pods. The output of dryland cultivation varies from 4 to 5 quintals depending on the season.
- ➔ India produces three to four quarts of guar gum on average. That's all there is to it. The anticipated cost of a plantation is Rs. 19,000 in 2019. The production cost of guar gum cultivation is roughly Rs. 10,000 due to inconsistent yield, fluctuating prices, and cultivation costs. Unstable prices, unstable production, and unstable agricultural costs. As a result, nowhere

could the guar gum region be stabilized.

CONCLUSION

Guar gum is a great option for excipients in the food, cosmetic, and pharmaceutical industries because of its wide range of physical and chemical qualities. For the treatment of some illnesses, native guar gum and its derivatives are utilized directly. Guar gum's chemistry makes it possible to chemically alter it to produce derivatives with desired qualities that are less costly, environmentally benign, and biodegradable. It is a readily available, naturally occurring polysaccharide that is safe and non-toxic, derived from a renewable natural resource.

