

## Guar Gum – An Important Agrochemical

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### SUMMARY

Cluster bean an important crop not only used as a fresh vegetable but it has many uses in the industrial purpose whose seed is used for extraction of gum called as guar gum. Guar gum is used in almost all types of industries viz., fertilizers, papers, petroleum, food additives, pharmaceuticals, food processing, cosmetics, textile printing, water treatment, sausages beverage, mining explosive, unique binding, dairy, oil drilling etc. Cluster bean seed is used as concentrate for animal feed and for extraction of gum. Byproduct from gum extraction process is of a high value protein feed (40% protein) for cattle.

### INTRODUCTION

The origin of *Cyamopsis tetragonoloba* a member of Leguminosae family (Prem et al. 2005) a very valuable legume and drought tolerant plant for crop rotation as it lives in symbiosis with nitrogen fixing bacteria is assumed to have developed from the African species *C. senegalesis*. It was further domesticated in India and Pakistan, where it has been cultivated for many centuries. Cluster bean is majorly growing in India, Pakistan, Indonesia, America, Italy, Mexico, Brazil, and South Africa. Cluster bean pods are green, long, thin vegetable pods. Crop grown for fresh vegetable, green manuring, green fodder, guar gum and seed purpose. Seed is used as concentrate for gum extraction and animal feed. Seed contains three parts: the seed coat (14-17%), endosperm (35-42%) which contains galactomannan gum and the germ (43-47%). The Cluster bean plant is essentially a sun-loving plant, tolerant of high environmental temperatures but very susceptible to frost (Whistler and Hymowitz 1979; Kay 1979). Major leguminous crop in India's dry and semi-arid regions during the Kharif season. For maximum growth the plant requires a soil temperature of 25–30°C and ideally, a dry climate with sparse but regular rainfall. Guar plant requires rain for optimum growth before planting and again to induce maturation of seeds. Excess of moisture during early phase of growth and after maturation of seeds results in lower quality guar beans. Guar gum industry developed in the 1940s and 1950s in United States was brought into the United States before World War I primarily as a green manure but was not used in industrial applications until 1943. The commercial development was made at the University of Arizona during World War II.

### Processing

- Guar gum processing varies from plant to plant.
- Seeds are separated from pods are spherical, brownish, smaller than pea seeds in size.
- The gum is commercially extracted from seeds by mechanical process of roasting, differential attrition, sieving and polishing.
- Guar seeds are broken and the germ is separated from the endosperm.
- Two halves of the endosperm from each seed and are un de-husked guar split. The fine layer of fibrous material, which forms the husk, is removed and separated from the endosperm halves by polishing, refined guar splits are obtained.
- The hull (husk) and germ portion of guar seed are termed as guar meal which is a major byproduct of guar gum powder processing and is utilized as cattle feed.
- The refined guar splits are then treated and finished into powders (known as guar gum) by a variety of processing techniques depending upon the end product desired.
- The pre hydrated guar splits are crushed in flacker mill and then moved to ultrafine grinder, the grinded material is dried and passed through screens for grading of the material according to the particle size.
- The byproducts of guar gum industry are Churi and Korma which are utilized for cattle feed.

### Guar Gum Characteristics

- It is a proficient thickening agent, contributing significantly to water retention.
- Exhibits rapid hydration when combined with cold water.
- Plays a crucial role in food formulations due to versatility due to free hydroxyl groups.
- Tasteless and lacks odor. Soluble in hot and cold water and insoluble in organic solvents.
- Stability and Homogeneity
- **Consumer Safety** - In animal species, guar gum exhibits non-absorption within the gastrointestinal tract, with no evidence of additive deposition in tissues and organs.
- **Environmental Safety** - Given the ubiquitous presence of its components in nature, incorporating guar gum into any animal's diet is deemed environmentally safe, ensuring harmony with our surroundings.
- Therapeutics of Guar Gum - Wound Healing, Laxative effects, Anti-inflammatory, useful for the treatment of constipation due to its high dietary fiber content.
- **Food applications** - In food industry as a novel food additive in various food products for food stabilization and as fiber source.
- **Beverages** - Guar gum is soluble in cold water which makes it easy to use in beverage processing plants. It improves the shelf life of beverages.
- **Processed cheeses** - Guar gum prevents syneresis or weeping by water phase management and thus also improves the texture and body of the product.
- **Dairy and bakery products** - Important role in ice cream stabilization because of its water binding properties. Wheat bread dough addition results in significant increase in loaf volume on baking.
- **Salad dressings and sauces** - On addition of guar gum serum loss and flow values decreases which makes it a novel thickener for tomato ketchup.
- **Health benefits** - Guar is completely degraded in the large intestine by *Clostridium butyricum*. Harmful effects are observed only when the guar gum is given to the animals at a high concentration of about 10–15% on weight basis.

### CONCLUSION

Cluster bean plant grown for centuries mainly in India and Pakistan where it is a most important crop that has long been used as food for humans and animals. Guar gum is an important agrochemical derived from the seed endosperm of is a useful material to investigate. It has wide applications in the industries more investigation is needed about the guar gum.

### REFERENCES

- Kay, D.E. 1979. Crop and product digest no 3-food legumes. Tropical Products Institute, London, pp 72–85
- Prem, D., Singh, S., Gupta, P.P., Singh, J., Kadyan, S.P.S. 2005. Callus induction and de novo regeneration from callus in guar (*Cyamopsis tetragonoloba*). *Plant Cell Tiss Org.* 80:209–214.
- Whistler, R.L and Hymowitz, T. 1979. Guar: agronomy, production, industrial use, and nutrition. Purdue University Press, West Lafayette.