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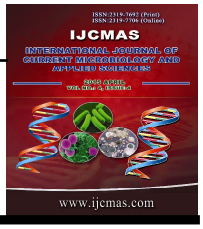


**Original Research Article**

# Evaluation of gum content and viscosity profile of different genotypes of guar from different locations

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**A B S T R A C T**

The samples of seeds of different genotypes of guar from All India Coordinated Research Project on Arid Legumes from different centers viz; Durgapura, Jodhpur, S K Nagar and Parbhani were evaluated for gum content and viscosity profile of aqueous guar gum solution in Dept of Food Chemistry and Nutrition, College of Food Technology VNMKV, Parbhani in the year 2012. It was revealed that the gum content was varied from 26.12 to 31.46 per cent. Genotype RGr-12-1 showed maximum mean gum content of 30.86 percent followed by genotype HGS-563(C) (30.09 %). Location wise, Durgapura ranked 1st in gum content (30.07 %) followed by Jodhpur (29.77 %). Viscosity varied from 2104 to 6240 mpa.s. Genotype Shakti var-X-6 showed maximum mean viscosity of 5164 mpa.s followed by RGr-12-4 (5068 mpa.s). Location wise, Jodhpur ranked 1st in viscosity of 4868 mpa.s followed by Parbhani (4781 mpa.s).

**K e y w o r d s**

Genotypes, guar gum, viscosity, location, legume and galactomannan

## Introduction

Guar bean is commercially grown for its seed, which contains guar gum. Guar gum is derived from the seeds of plant *Cyamopsis tetragonolobus*, a pod bearing legume grown commercially in India, Pakistan and the southwestern United States. The seed is composed of hull (15%), germ (45%), and endosperm (40%). The endosperm contains 75-85% of the hydrocolloid, has a chain of (1à 4)-linked-b –Dmannopyranosyl units with single a –Dgalactopyranosyl units connected by (1à 6) linkages to, on the average, every second main chain unit. The ratio of Dmannopyranosyl to D-galactopyranosyl units is about 1.8:1. The average molecular weight of the galactomannan is in the range of 1-2 x 106 dalton Mayer *et al* (1993).

Among various commercially utilizable seed gums, guar gum and its derivatives occupy a very important place, as it is a rich source of high quality galactomannan polysaccharide. Due to its unique rheology modifying properties, guar gum and its derivatives are

widely used across a broad spectrum of industries — food, cosmetics, textile, paints, mining, oil-well drilling, construction etc Sharma *et al* (2009).

The crop has various uses, amongst which are vegetables for human consumption, fodder crop, soil fertility improvement through biological nitrogen fixation. In the food industry, the gum is used as a viscosifying agent in sauces and dressings; stiffener to improve the consistency of ice creams and yogurt; stabilizer in fruit beverages and juices, cheeses and alcoholic beverages; preservative in frozen foods and baked foods such as bread and biscuits; gelling agent in jams, jellies, fruit spreads and jelly sweets and binding agent in salad dressings, instant noodles and processed meats Surendra T. *et al* (2013). Guar gum is an economical thickener and stabilizer. It easily hydrates in cold water to give highly viscous solution. The very high viscosity attained at low concentrations makes guar gum an excellent thickener in the food industry, such as in soups, desserts, pie fillings . Guar gum and its derivatives are major ingredients in drilling muds and fingering fluids in oil industry and in the textile industry guar solutions help to improve the printing quality Wang *et al*. (2006)

Guar gum is non-toxic and non-ionic is compatible and miscible with virtually all known water soluble gums, both natural and synthetic and is one of the most powerful water binders and viscosity builders. Because of availability and ease of manufacture, guar gum is most cost effective natural thickener Wang *et al* (2006). The objective of this research was to evaluate gum content and viscosity profile of different genotypes of guar at different locations to compare and to get acquainted with the variety yielding highest gum content and viscosity.

## Materials and Methods

Seed samples of guar genotypes of 15 varieties (viz. RGr- 12-2, GAUG-815,CAZG-12-1,Shakti-424, HGS-16, GAUG-817, RGr-12-1, RGr-12-5, CAZG-12-2, HGS-563(C), RGr-12-3, HGS-2-20 (C), RGr-12-4, Shakti var-X-6 and GAUG-819) were obtained from All India Coordinated Research Project on Arid Legumes from different centres viz; Durgapura, Jodhpur, S K Nagar and Parbhani for the quality analysis. These samples were evaluated for gum content and viscosity profile of aqueous guar gum solution of different genotypes with some national check genotypes *viz.* HGS-563(C), RGr-12-3, HGS-2-20 (C) included in those 15 genotypes.

### Extraction and purification of guar gum

The guar gum was isolated by wet process as per the method developed by Rodge *et al* (2006) in laboratory scale. The mature seeds were cleaned and boiled in 2 % alkali for 5-10 min to remove husk or hull portion. Then seeds were washed under running water and neutralized with acid(0.1N HCl) and again washed in water. Husk was removed and dried for over-night. The seeds were pulverized to get splits. The splits were converted to powder form, known as crude gum. The crude gum was suspended in aqueous solution of iso-propanol in which gum will be separated as precipitate and resultant precipitate was centrifuged. The purified gum was vacuum dried and pulverized to 200 meshes.

### Viscosity profile

The viscosity profile of 1 per cent gum solution was carried out at $37\pm^{0}1$C by using Hake's Rotoviscometer (RV-20) Rodge *et al* (2012).

**Table.1** Per cent gum content of different genotypes of guar grown at different locations

| Sr. No. | Genotypes | Durgapura | Jodhpur | Parbhani | SK Nagar | MEAN | RANK |
|---|---|---|---|---|---|---|---|
| **1** | RGr- 12-2 | 29.46 | 27.80 | 26.73 | 27.96 | 27.99 | **14** |
| **2** | GAUG-815 | 31.46 | 29.81 | 28.32 | 28.72 | 29.58 | **6** |
| **3** | CAZG-12-1 | 29.94 | 30.91 | 28.28 | 28.71 | 29.46 | **8** |
| **4** | Shakti-424 | 30.42 | 29.77 | 27.97 | 30.18 | 29.59 | **5** |
| **5** | HGS-16 | 29.49 | 30.13 | 27.32 | 29.89 | 29.21 | **10** |
| **6** | GAUG-817 | 28.94 | 29.52 | 30.72 | 29.71 | 29.72 | **3** |
| **7** | RGr-12-1 | 31.07 | 30.93 | 30.90 | 30.52 | 30.86 | **1** |
| **8** | RGr-12-5 | 30.16 | 30.40 | 28.08 | 30.15 | 29.70 | **4** |
| **9** | CAZG-12-2 | 29.63 | 27.66 | 20.05 | 30.62 | 26.99 | **15** |
| **10** | HGS-563(C) | 30.64 | 30.93 | 28.59 | 30.21 | 30.09 | **2** |
| **11** | RGr-12-3 | 28.87 | 27.17 | 29.78 | 28.97 | 28.70 | **12** |
| **12** | HGS-2-20 (C) | 30.20 | 30.36 | 26.77 | 30.93 | 29.57 | **7** |
| **13** | RGr-12-4 | 29.93 | 30.26 | 26.49 | 26.12 | 28.20 | **13** |
| **14** | Shakti var-X-6 | 30.35 | 30.00 | 26.17 | 28.88 | 28.85 | **11** |
| **15** | GAUG-819 | 30.44 | 30.84 | 28.15 | 27.69 | 29.28 | **9** |
| | **Mean** | 30.07 | 29.77 | 27.62 | 29.28 | | |
| | SE ± | **0.0157** | **0.0107** | **0.0149** | **0.0092** | | |
| | **CD at 5%** | **0.0456** | **0.0310** | **0.0431** | **0.0267** | | |

**Table.2** Viscosity profile (mpa s) of 1% gum solution of different guar genotypes of different locations

| Sr. No. | Genotypes | Durgapura | Jodhpur | Parbhani | S K Nagar | MEAN | RANK |
|---|---|---|---|---|---|---|---|
| 1 | RGr- 12-2 | 2145 | 5650 | 5840 | 5920 | 4889 | **4** |
| 2 | GAUG-815 | 4520 | 5880 | 5133 | 4460 | 4998 | **3** |
| 3 | CAZG-12-1 | 2190 | 5510 | 4520 | 3260 | 3870 | **10** |
| 4 | Shakti-424 | 2388 | 4340 | 4490 | 3510 | 3682 | **13** |
| 5 | HGS-16 | 2104 | 3670 | 4120 | 3120 | 3254 | **15** |
| 6 | GAUG-817 | 3546 | 4510 | 4665 | 2620 | 3835 | **12** |
| 7 | RGr-12-1 | 5600 | 5879 | 6240 | 2220 | 4658 | **5** |
| 8 | RGr-12-5 | 2120 | 3760 | 5340 | 2565 | 3446 | **14** |
| 9 | CAZG-12-2 | 5480 | 4460 | 3560 | 3820 | 4330 | **7** |
| 10 | HGS-563(C) | 4300 | 4500 | 4421 | 2230 | 3863 | **11** |
| 11 | RGr-12-3 | 2360 | 5840 | 5520 | 3248 | 4242 | **9** |
| 12 | HGS-2-20 (C) | 2920 | 4330 | 5730 | 4220 | 4300 | **8** |
| 13 | RGr-12-4 | 5940 | 4130 | 5360 | 4840 | 5068 | **2** |
| 14 | Shakti var-X-6 | 5230 | 6140 | 3560 | 5724 | 5164 | **1** |
| 15 | GAUG-819 | 4123 | 4420 | 4520 | 4560 | 4406 | **6** |
| | **Mean** | 3664 | 4868 | 4781 | 3754 | | |
| | **SE ±** | **29.8157** | **10.9971** | **12.0298** | **12.7528** | | |
| | **CD at 5%** | **86.4398** | **31.8821** | **34.8760** | **36.9720** | | |

| Genotypes | Durgapura | Jodhpur | Parbhani | SK Nagar |
|---|---|---|---|---|
| GR-1 | 29.46 | 27.80 | 26.73 | 27.96 |
| GR-2 | 31.46 | 29.81 | 28.32 | 28.72 |
| GR-3 | 29.94 | 30.91 | 28.28 | 28.71 |
| GR-4 | 30.42 | 29.77 | 27.97 | 30.18 |
| GR-5 | 29.49 | 30.13 | 27.32 | 29.89 |
| GR-6 | 28.94 | 29.52 | 30.72 | 29.71 |
| GR-7 | 31.07 | 30.93 | 30.90 | 30.52 |
| GR-8 | 30.16 | 30.40 | 28.08 | 30.15 |
| GR-9 | 29.63 | 27.66 | 20.05 | 30.62 |
| GR-10 | 30.64 | 30.93 | 28.59 | 30.21 |
| GR-11 | 28.87 | 27.17 | 29.78 | 28.97 |
| GR-12 | 30.20 | 30.36 | 26.77 | 30.93 |
| GR-13 | 29.93 | 30.26 | 26.49 | 26.12 |
| GR-14 | 30.35 | 30.00 | 26.17 | 28.88 |
| GR-15 | 30.44 | 30.84 | 28.15 | 27.69 |
| | | | | |

The data on gum content of guar genotypes was depicted in table1.It reveals that the gum content varied from 26.12 to 31.46 per cent. Genotype RGr-12-1 showed maximum mean gum content of 30.86 percent followed by genotype HGS-563(C) (30.09 %). Locationwise, Durgapura ranked 1st in gum content (30.07 %) followed by Jodhpur (29.77 %).

The result on viscosity profile of aqueous 1% guar gum solution of various guar genotypes depicted in table 2 which reveals that the viscosity varied from 2104 to 6240 mpa.s. Genotype Shakti var-X-6 showed maximum mean viscosity of 5164 mpa.s followed by RGr-12-4 (5068 mpa.s). Location wise, Jodhpur ranked 1st in viscosity of 4868 mpa.s followed Parbhani by (4781 mpa.s).

It was thus informed that the on the basis of mean value 'RGr-12-1 'showed highest gum content i.e. 30.86 percent and 'CAZG-12-2' showed lowest gum content i.e. 26.99 per cent. Location wise, maximum viscosity was found in Jodhpur (4868 mpa.s) followed by Parbhani (4781 mpa.s).

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