

What is Guar?

- Guar or cluster bean (*Cyamopsis tetragonoloba*) is a drought tolerant legume crop traditionally grown for centuries in south Asia including India.
- The word "Guar" comes from Hindi, meaning "cow food". It produces pods in clusters, hence called clusterbean.
- Guar can be grown for protein-rich high quality forage for animals or can be grown for fresh pods for vegetables, or for seed to produce guar gum.

What is Guar Gum?

- Guar gum is obtained from the powdered endosperm of the guar seed (Fig. 1a-b) and is mainly consisting of the high molecular weight polysaccharides of galactomannan which give it unique biochemical properties including high viscosity.

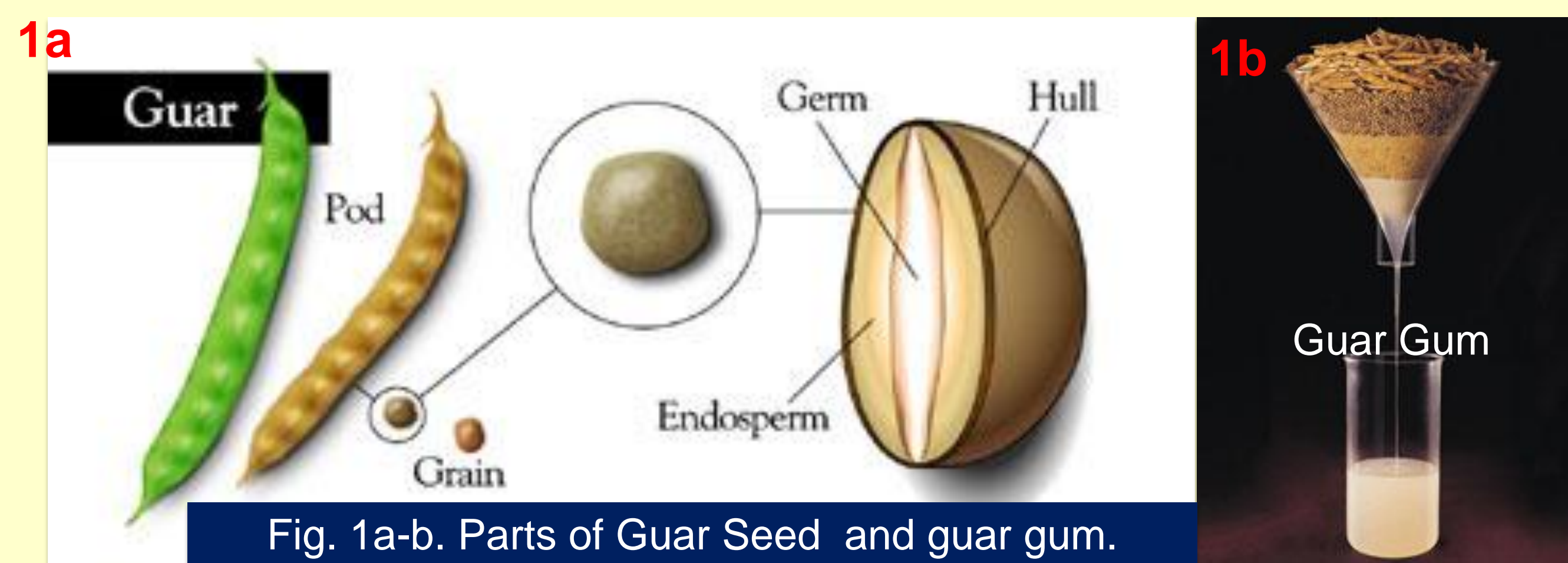


Fig. 1a-b. Parts of Guar Seed and guar gum.

Why Guar Gum?

- Guar gum is widely used as an emulsifying or stabilizing ingredient in range of food products and cosmetics (Fig. 2).



Fig. 2. Examples of products containing guar gum

- More recently, unique viscosity properties of guar gum have proven effective in stabilizing water and sand mixture in oil extraction technique of hydraulic fracturing or 'fracking' by horizontal oil drilling and sequential fracking.
- These fracking technologies have enabled extraction of previously un-retrievable hydrocarbons from shale formations and have revolutionized natural gas industry resulting in higher projected U.S. and global natural gas production (Fig. 3).

Future Potential of Guar

- Newly found use of guar gum in oil drilling has resulted in an unprecedented increase in demand for guar gum by the US oil industry making the US the biggest user and importer of the guar gum or seed in the world.
- US imported guar gum or seed worth \$1 billion from India in 2011.
- To supply the 19,000 wells drilled in 2012 would require in excess of 90,000 tons of guar gum or the equivalent of 500,000 acres of domestic guar production just for the U.S. petroleum industry.

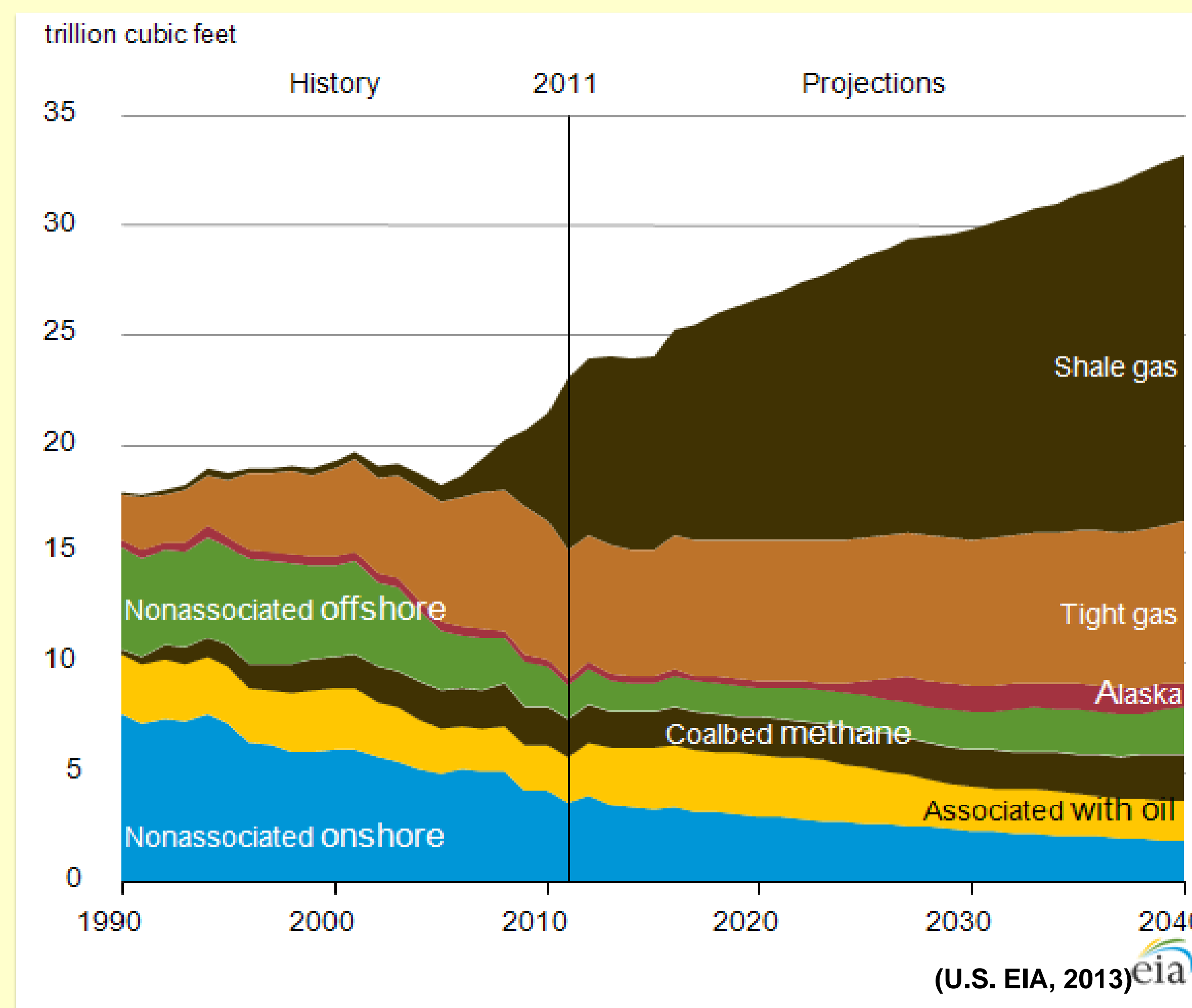


Fig. 3. U.S. dry natural gas production: history and projections.



Fig. 4. Close-up of guar plant with clusters of pods



Fig. 5. Obtaining guar seeds from pod to processing in lab for guar gum.

Growing Guar in New Mexico

- Guar can be adapted to semi-arid region of desert southwest including New Mexico due to its ability to tolerate heat and water stress.
- Research has been initiated in investigating adaptability of a large collection of guar genotypes originating from various parts of the world (Fig. 6a-b) for their seed productivity and guar gum content in New Mexico conditions.

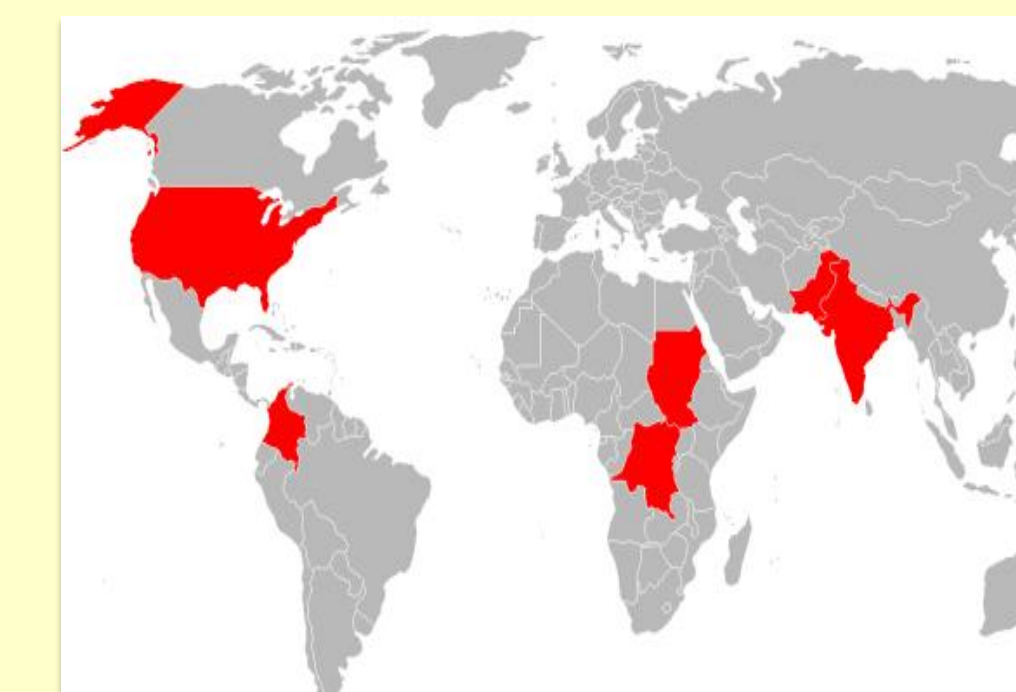


Fig. 6a. Countries of Origin



Fig. 6b. Testing Guar Viability

Table 1. Range, mean and median values for growth and yield characteristics of guar genotypes tested in New Mexico.

Plant character	Range	Mean	Median
Plant height, cm	31.8-144.8	96.0	94.0
Branches/plant	0-32	12.0	11.0
Clusters/plant	13-74	31.4	28.5
Pods/cluster	0-13.3	5.5	5.6
Pod length, cm	0-9.9	5.3	5.3
100-seed weight, g	0-4.4	3.1	3.0
Seed yield/plant, g	0-92.7	34.3	33.1

- Initial results (Table 1) show several guar genotypes grew successfully producing reasonable yields of guar seed, indicating guar can be adapted into local cropping systems.
- Future studies are needed to investigate:
 1. Agronomic management including optimum planting time, spacing, water requirements in the region.
 2. Guar gum content and properties.

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