



Guar Production in Texas

Calvin Trostle, Ph.D.

Extension Agronomy, Texas A&M AgriLife-Lubbock

(806) 746-6101, ctrostle@ag.tamu.edu

Updated January 2018

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Why Guar? Why Now?

- ⦿ Guar gum is highly valuable and sought after as an ingredient from small quantities in numerous food products to large scale uses in oil field services (e.g., a component of frac fluids)
- ⦿ Desirable viscosity, a carrier for materials into deep wells, “cleans out” relative well (no residues remaining)

About this information...

- ⦿ The information provided is a collection of field observations, limited research, and the input from several farmers and processor staff
- ⦿ It is generally relevant for the Texas South Plains and Rolling plains, but it generally applicable as well in southwest Oklahoma and eastern New Mexico (info. is also generally relevant for the Texas Coastal Bend and Lower Rio Grande Valley where there has been limited production in the past).
- ⦿ Guar is not well adapted to humid regions of Central Texas, for example, the I-35 corridor due to higher humidity and rainfall which fosters much more disease pressure than normally observed in the HP & RP.

The Value of U.S. Guar Gum Imports

- ⦿ According to the USDA Agricultural Marketing Service, in 2011 in the Port of Houston (Texas) guar gum imports were ~225,000 metric tons (80% of U.S. total).
- ⦿ At historical guar gum prices of \$2 to \$3/lb., this translates to an import value of \$1.0-1.5 billion
- ⦿ This represents about 2.3 million acres of production (at 800 lbs./acre, which is an average yield in the U.S., but double the average yield in India).

Yes, Guar! Yes, Now!

- ⊙ Uses range from a company needing a few tons to make tens of thousands of tons of food ingredients or finished food products, to an industry estimate of as much as 20,000 lbs. of guar gum to frac one oil well.
- ⊙ Can enough guar be produced for the oilfield industry? One frac job could require 80 acres of guar production (750 lbs./A)
- ⊙ **FTS International, Ft. Worth, uses 1,700 tons of guar gum (2012) a month (3-4X current annual U.S. production)**
- ⊙ Caremoli USA, 20,000,000 lbs. of guar gum as a food ingredient (~90,000 acres at 750 lbs./A)
- ⊙ Halliburton, mid-2012, guar gum was 30% of material cost to frac a well (this during a time of severely inflated prices for foreign guar gum)

The (Undeserved) Perception of Guar: “Low-Input/Stepchild Crop” (USA) “Poor Man’s Crop” (India)



Guar Materials



Gum

Deriva-
tives (HPG)

Meal

Splits

Seed
Coat

Raw
Seed

Pods

Samples courtesy West Texas Guar

Guar Markets

- ⊙ Much of the guar consumed in the U.S. is imported from India and Pakistan as ‘splits’—the endosperm (which contains the valuable gum); the seed coat and embryo have been removed.
- ⊙ As a rule of thumb for basic understanding, the seed components are:
 - ⊙ Embryo, 45%
 - ⊙ Seed coat, 15%
 - ⊙ Endosperm, containing the gum, 40%
- ⊙ **Figure about 28% of raw seed weight is net extractable gum**



Guar Markets

- ⊙ International market for guar and guar gum drives you nuts! There is no rhyme or reason to pricing or availability. A manipulated market.
- ⊙ Some companies suggest the gum quality of imported guar is better than U.S. production
- ⊙ **Is this fact or perception?**
 - ⊙ Texas Tech Univ. research suggest quality can be comparable
 - ⊙ Guar grades/quality for fracking vs. guar for food—fracking guar actually has higher standards (need to hydrate quickly under high pressure and temperature)



Guar Markets

- ⊙ U.S. companies need a stable supply, and appear more willing to pay the needed cost.
- ⊙ Due to volatility in the international market (which is controlled and does not necessarily reflect market conditions), interest rises in investing/establishing U.S. production when prices are high
- ⊙ What about food vs. industrial use debate?
 - ⊙ Blue Bell ice cream—the 2012 run-up in guar prices amounts to ~10-12 cents higher ingredient cost per half gallon carton which costs \$5-6



Texas USA Guar Area

2008-2013

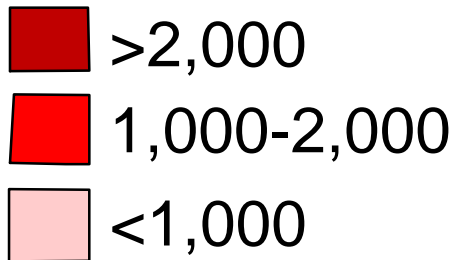
★ Regional Center

Rolling Plains (Vernon)

South Plains
(Brownfield)

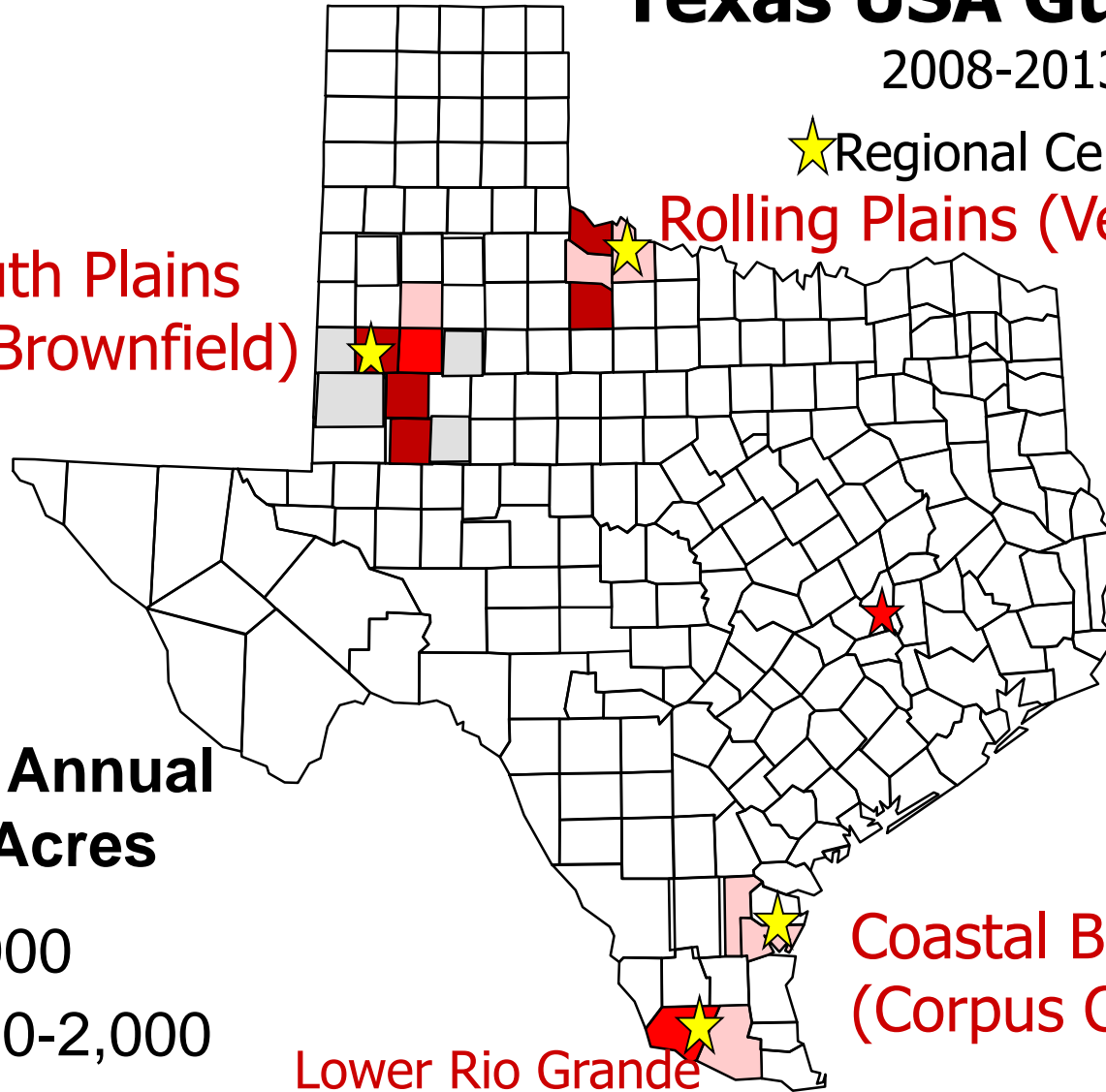
Texas A&M
University

Approx. Annual
County Acres



Coastal Bend
(Corpus Christi)

Lower Rio Grande
Valley (McCook)



Volatility of Seed Price for Farmers

- ⊙ 2013 price was the highest ever, \$0.45/lb. for standard Grade #1 (though offered *after* extreme guar prices in 2012 had returned to more historic levels by early 2013)
- ⊙ Phone calls and e-mails: “With the high cost of guar gum, why isn’t guar production contracting at least \$0.50/lb., even \$1.00/lb.?”
- ⊙ The late 2012 crash in guar gum prices might be why!!! Prices even lower now—volatile!
 - ⊙ In late spring/early summer 2012 guar gum was as high as \$12/lb. Then by mid-September 2012 guar gum prices were back down to about \$3.50 per lb., then \$2.00/lb. in Fall 2013, and <\$1.50 lb. in late 2014/early 2015

Guar & Crop Insurance

- ⊙ Currently no meaningful crop insurance (not a program crop)
 - ⊙ A viable private crop insurance product was potentially in place for 2014, but the West Texas Guar bankruptcy ended any meaningful crop production for 2014-2015
- ⊙ Lending agencies may not loan money on guar without crop insurance
- ⊙ Currently only NAP insurance is available, and it may be not economical to justify purchase
- ⊙ Private entities may step in before USDA can conduct pilot programs, etc. to evaluate guar insurance products

The (Undeserved) Perception of Guar: “Low-Input/Stepchild Crop” (USA) “Poor Man’s Crop” (India)



Key Guar Considerations

- ⦿ Indeterminant, annual legume
- ⦿ Good for rotations with cotton, sorghum, etc. (1970's at Texas A&M AgriLife—Vernon: 15% lint yield increase the following year; subsequent data from the Texas A&M AgriLife Research station at Chillicothe suggest a lower yield benefit)
- ⦿ As drought tolerant—if not more—than any other crop in Texas (sesame would be similar)
- ⦿ Low risk

Guar

- ⊙ With sesame, the most drought tolerant crop on South Plains
- ⊙ Low input crop
- ⊙ No insects or disease treated in production since ~1998
- ⊙ Target planting date: mid-May to about July 1
 - ⊙ Rolling Plains or High Plains; much of the guar is planted late in this window, and we wonder if this may curtail yields some years (cool September weather can hasten loss of leaves)
- ⊙ Harvest generally November-December in High and Rolling Plains (but use of harvest aid could hasten harvest a month or more)
- ⊙ How quickly can new crop guar gum be available? Could potentially hit market in December if facilities can process quickly (earlier with harvest aid)

Guar--Profitability 'Keys'

- ⦿ Production as a primary crop is better than as catch crop
- ⦿ Wait to plant until soil moisture for germination/emergence is good



Guar--Profitability 'Keys'

- ⊙ Irrigation response: ~100-150 lbs./A per 1”
 - ⊙ Caveat: 2001, Dawson Co.
 - ⊙ Dryland corners, 1,100 lbs./A (a good year!)
 - ⊙ Over-the-top sprinkler irrigation same as neighboring peanuts, 700 lbs./A (frequent spray irrigation) interfered with flowering, pollination, seed set, or all three
 - ⊙ Consider **drag hoses for irrigation** other than initial watering to get crop up

Guar--Profitability 'Keys'

- ⊙ Experienced harvesters with right headers and can increase harvestable yield considerably
 - ⊙ Especially with air-reels, which I think are worth the added cost (\$2-4/acre) with the custom harvester (Barrington Brothers, Oklahoma)
 - ⊙ Since guar has a tendency for the pods to break off at harvest (break off, not split open), the air reel blows these shattered pods into the header

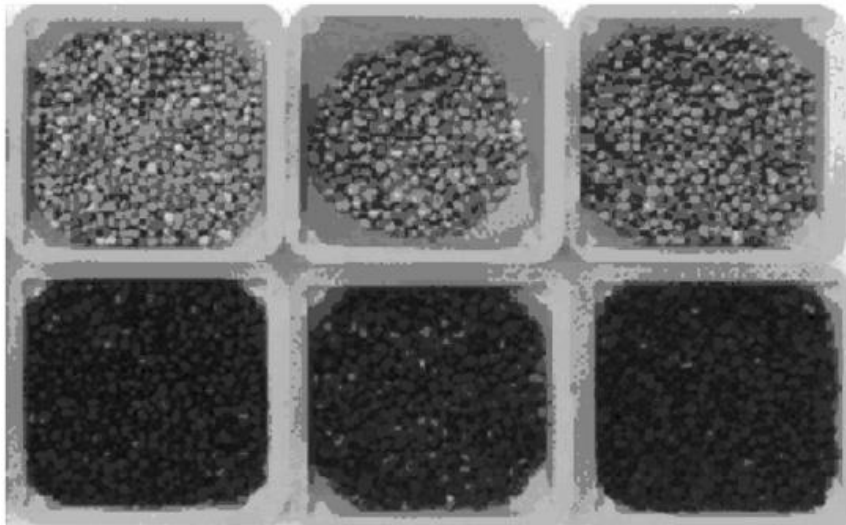
Seed Quality

- ⦿ Germination %? Maintain as high as you can get, but some guar may have germ of only ~67% after a couple of years
 - ⦿ Long-term seed storage usually sees guar seed quality deteriorate to unacceptable levels after ~8 years
- ⦿ Guar seed must be free of morningglory! Similar size & shape seed that can't be cleaned out

Seed Quality—Black Seed

- Texas Tech Univ. research on black seed, which is often assumed to be of inferior quality, and appears to be more common in the Rolling Plains than in the High Plains
- Germination is higher in black seed (degradation of seed coat, better water uptake), but endosperm content was not significantly different—gum **content** and **quality** not

reported among different colored seeds.



Dull
white

Black

Journal of Arid Environments 70 (2007) 29–38.

PI 217923

PI 340246

Lewis

Raw Guar Grading Standards

These are industry grades for U.S. grown guar off the farm (there is no Federal standard). Contract price is based on #1 Grade, and will specify discounts for lower grade. In many years all guar delivered to former WTG was #1.

<u>GRADE</u>	<u>MOISTURE MAXIMUM</u> (%)	<u>MINIMUM TEST WEIGHT</u> (Lbs./Bushel)
#1	13.5	60
#2	14.0	59
#3	14.5	58
#4	15.0	57
SAMPLE GRADE	above 15.1	below 56.9

Guar price may discount for black/dark seed above a certain % as dark seed may indicate possible lower gum quality. Dark seed often occurs due to greatly delayed harvest, rainy weather after maturity, or both.

Guar Resources currently discounts only if black seed > 50% though it is certainly best to minimize it (black seed is a little more difficult to process).

What Growers Say Since 2001

- ⊙ Use higher seeding rates, maybe 8 lbs./A even on dryland
- ⊙ If irrigated, water up vs. planting into moisture (preferred?); watch for crust
- ⊙ Reduced performance on ground which has undergone 'deep breaking' tillage (12-16")
- ⊙ "I like the condition of my ground after guar"
- ⊙ "My cotton looks better after guar"
- ⊙ Roundup Ready "flex" cotton aids control of volunteer guar the next year (can be sprayed season long if needed)

What Growers Say Since 2001

- ⦿ “Butch job” harvesting—avoid it
- ⦿ Pay for experienced harvesters with right equipment
- ⦿ How are you going to harvest?—ask at planting time
- ⦿ “Got to get into the dirt” with your header to get all the yield
- ⦿ Chemical termination or bean knifing?

Where Must Guar Yields Go? And What Type of Production?

- ⊙ Guar at 50,000 acres in the U.S. vs. 250,000 acres or even 500,000 acres annually?
- ⊙ Large guar gum users need major **consistent** supply to substantially commit to U.S. guar (quality considerations perhaps a different matter)
- ⊙ 200 million pounds of guar gum use in North America? That's about 700,000 acres of production at 1,000 lbs./A.
- ⊙ **We can't reliably achieve this with only dryland**—to make this potential viable and reliable, we have to:
 - ⊙ increase yield per acre (breeding, GMO?, management)
 - ⊙ produce some guar on irrigated land to minimize drought

Current USDA Funding on Guar

- ⦿ Guar is generating interest at the federal level for research and extension funding, including the following:
 - ⦿ Guar Planning Proposal (project outcome is a plan for a larger USDA proposal to link OK, TX, NM, AZ research into a coordinated four-year project to be submitted in 2018). \$35,000
 - ⦿ Guar-Wheat Rotations—project targets Northern Texas Rolling Plains and South Plains, 2017-2021; \$499,000
 - ⦿ Guar Breeding & Management in a Semi-Arid Region, ~\$88,000
 - ⦿ Guar is a component (about 10%) of a five-year AZ-NM bioenergy project focused mostly on guayule (native plant that produces a natural rubber), 2017-2022, ~\$1.5 million (approximate guar portion).

For Further Information

- ◎ <http://lubbock.tamu.edu/othercrops/guar>
- ◎ Your contractor

