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## **Guar in the United States— Prospects for Domestic Seed Supply & Impact on Gum Supplies**

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This summary is in response to numerous guar inquiries from industry, prospective investors, and producers to the Texas AgriLife/Texas A&M University agriculture program since early 2011. Currently, on an annual basis guar in the U.S. is contracted and mostly grown in the lower Texas High Plains (Lubbock region), the Rolling Plains (to the east, toward Vernon and Wichita Falls, TX), and occasionally in southwest Oklahoma. Some scattered acreage is also contracted and grown in the Concho Valley/San Angelo region as well as the Texas Gulf Coast/Corpus Christi area as well as possible 2012 acreage in New Mexico, Arizona, and California.

### A Short History of U.S. Guar Production

Guar (*Cyamopsis tetragonoloba*) was first grown in the U.S. Southwest, primarily Texas and Oklahoma, in the early 1900s. Crop production gradually moved to fully mechanical harvest as soon as combine harvest equipment was available. Intermittent acreage occasionally reached 100,000 acres depending on markets, access to a buyer/processor, and prices of other agricultural crops.

Texas acreage since 1999 has fluctuated from about 7,000 to 50,000 acres, the high years due to raw guar seed contracting/purchase by Rhodia, Inc. Vernon, TX, and a price in the early 2000s that was about \$0.20/lb., but in later years the price dropped to as low as \$0.125/lb., which provided farmers no incentive to contract and grow guar. Standard contracts define price, discounts, delivery points, and acceptable grades. At the same site adjacent to the splitter Rhodia also processes imported splits as do several other locations in the U.S.



Figure 1. Above-average dryland guar field in August, Terry Co., Texas (left); mature guar plant nearing harvest (center); guar seed, variety 'Kinman', with some nearly black seed from possible delayed harvest (right), which may represent possible reduction in gum quality.

## Suitability of Guar Production in the Southwest U.S.

Guar is as heat tolerant and drought tolerant as any crop as you can grow in Texas and much of the U.S. Southwest. The yield potential and gross income potential do not match other crops because in part guar 1) is much less costly to produce (so consider net return, rather than the basic ability to generate gross revenue for a farmer), and 2) guar does not respond as well to inputs like irrigation and fertilizer as corn or cotton or sunflower. Furthermore, current U.S. guar varieties increasingly demonstrate disease issues as the production environment becomes more moist or humid. The crop's relative advantage, compared to other common agricultural crops in the U.S., is at the dry end of the spectrum where these inputs have less effect.

But guar is an inexpensive crop to grow, and this alone merits consideration. Guar is suited to marginal quality farmland including sandy soils. Numerous farmers have commented how they like the condition of their land after growing guar, and guar is a good rotation with any crop including cotton and grain sorghum. One hindrance is that guar requires grain harvest equipment (a combine) which most cotton farmers in the guar production regions of Texas do not have.

Guar is generally regarded at best as a rotation crop with other agricultural commodities, and it is not a crop that expects to be grown continuously. Because guar does not generate high gross revenue it not likely a crops that farmers can readily grow if they are trying to service a high debt load.

## Current Status of U.S. Guar Production and Supply (2012)

The 2012 contract guar grain price delivered to West Texas Guar, Brownfield, TX is \$0.35/lb. for #1 grade (was \$0.30/lb. in 2011). An early advance payment on production may apply if planted guar is emerged by a certain date. Contract acreage was about 20,000 acres in 2011, but due to the massive drought in the U.S. Southwest and the fact that most guar is grown without irrigation, there was little 2011 production. Potential contract acreage for 2012 through WTG is currently about 50,000 acres, but this could increase and will depend on other crop prices such as cotton, the lingering drought, the ongoing tendency to choose crops that have crop insurance (not guar), etc.

Frequent discussion is held about the potential for guar production to increase to 100,000 acres, even 250,000 acres, in the near future. Because of the volatility in the market, current contracting and investing has moved cautiously as the market economics for increasing guar which look favorable at current gum prices may be a moot point at guar gum pricing at half the current value. Because guar gum is not listed on a commodity board in the U.S. there is no primary trade apparatus for buying and selling guar gum. Thus apart from individuals and companies agreeing to do so, there is no means to lock in domestic guar prices or price guar at some point in the future.

Guar contracts with U.S. growers have always been based on acres of production rather than pounds per acre. This makes the contracts much less risky especially for the U.S. Southwest were yields can fluctuate dramatically due to drought or storm damage.

## Can U.S. Guar Production be Greatly Increased Immediately?—Oil Well Fracking Demand

The massive increase in demand for guar in the U.S. has driven guar gum prices to unprecedented levels, as much as \$12/lb. in some cases. Reported oilfield services industry numbers suggest that an average amount of guar gum required per fracking job could be as high as 20,000 lbs. This requires 80 acres of average yielding dryland guar production in West Texas to supply enough guar to frack just one well. (For planning purposes dryland guar is pegged at about 750 lbs./A (and about 95% or more of current U.S. production acreage), and about 1,250 lbs./A for limited irrigation. Yields rarely reach 2,000 lbs. per acre, not because

guar couldn't do so, but for that amount of irrigation producers will want to grow other crops, which are likely more efficient with additional water. Guar gum is approximately 30-33% of the total raw seed weight.)

Greatly increasing U.S. guar production—if it can be done—may still not have the desired impact on guar gum availability. Oilfield service companies would like to propel 2012 Texas acreage far higher, well above 100,000 acres. The current tendency among guar industry players, including the region's current sole farm production contractor West Texas Guar in the U.S., emphasizes stable, long term production as a viable rotation crop rather than immediately increasing production by multiples of current production acreage to meet immediate needs.

- *Increased guar production in the U.S. must be planned.* Failure on the part of contractors, seed suppliers, lack of firm pricing that farmers can rely on, etc. can quickly create a bad memory among farm producers. Currently there is not enough planting seed to dramatically increase planting acreage for 2012, and no company other than WTG has any significant volume of planting seed.
- *What guar contract price in 2012 could lead to a significant shift into guar production?* This question was posed to Dr. Jackie Smith, Texas AgriLife Extension Service agricultural economist at Lubbock. Whereas current contract price for guar production is offered at \$0.35/lb., Dr. Smith believes that in the current environment where cotton is roughly \$0.70/lb.—but offers a strong crop insurance program and guar has none—that it might take as much as \$0.50/lb. for guar to move a significant number of producers and acres out of cotton into guar.

#### Limitations to Domestic U.S. Guar Supply—No Guar Crop Insurance and Other Factors

As noted above crop insurance, or the lack of it, for guar production is without question the #1 reservation to growing guar put forth by prospective growers. Crop insurance is needed to manage risk in a semi-arid region, may be required by agricultural lenders, and is just too important to readily forego.

Research and education in the U.S. can improve guar production by focusing on key issues that could improve guar production and profitability. These include:

- Intermediate term—completion of herbicide labeling process for 2,4-DB as an over-the-top herbicide (guar is not well suited to weedy farmland); redevelopment of a suitable *Rhizobium* inoculant for this legume crop; examination of the use of harvest aids which might offer an immediate improvement in guar gum quality by preserving gum quality and protecting against weather driven degradation and delayed harvest (see below for specific discussion).
- Long-term needs--improved gum quality and yield for varieties adapted to the region. This would involve restarting the guar breeding project at Texas Tech Univ. (see below) most likely in partnership with Texas AgriLife/Texas A&M University.

Grant funding or company investment is needed to facilitate these likely improvements in guar gum quality, genetics, and production efficiency.

#### Limited Texas Guar Research since 2000

Texas Tech University professor Dr. Ellen Peffley (retired) headed guar breeding efforts in the late 1990s and early 2000s. The Ph.D. dissertation in that work concluding in 2003 was by Dr. Weixin Liu. His dissertation was published in several papers that may offer comparisons

among domestic (U.S.) and foreign guar or perhaps the domestic lines (long-time varieties Kinman, Lewis, Santa Cruz, Esser) vs. new TTU varieties Matador, Monument, and other experimental lines.

Dr. Dick Auld, another Texas Tech breeder also associated with the guar project believes the TTU work demonstrated that the U.S. guar varieties in general had higher molecular weight than Indi/Paki material, which led to improved viscosity (desirable), which led to better utilization of guar in fracking gels. Companies in the U.S. have generally stated that Indi/Paki guar may have better gum qualities than U.S. grown guar, but this may depend on the end use. I don't know if the same properties would be desirable in foodstuffs.

#### Factors that May Impact Current U.S. Guar Gum Quality

Environment may have some impact on U.S. guar gum quality. Questions have arisen about how the quality might differ from dryland production in Texas where drought stress can be frequent and prolonged vs. the same variety grown with a limited amount of irrigation. Also, it is believed that late-season weather conditions could negatively affect gum properties and molecular weight. Late-season weathering of guar that is left in the field until killed by a freeze in order to harvest, and which may be subject to rainy weather during this time (more likely to the east in the Texas Rolling Plains than in the High Plains region), will likely have more black or darkened seed. This leads to difficulty in splitting (effectively removing all of the seed coat due to changes in seed coat properties, or perhaps cracking of the seed coat), and as a result could diminish gum quality or the ability to obtain higher purity guar gum without seed coat fragments.

Potential use of harvest aids, as is frequently conducted in all regional cotton production, could be applied late in the season (as soon as early to mid-October, depending on local elevation) when little additional yield is being produced due to cool weather. This could lead to harvest several weeks to a month earlier.

#### Current U.S. Guar Entities Involved in Production/Processing of Domestic Guar

The guar business in the region here currently consists of two primary entities:

- West Texas Guar, Brownfield, TX, (806) 637-4662, <http://www.westtexasguar.com> (Klint Forbes, owner/manager, [klint@westtexasguar.com](mailto:klint@westtexasguar.com)). West Texas Guar currently serves as the only contractor and receiver for farm production of guar in the U.S. West Texas Guar is also the only significant source of guar seed in the U.S., but they only provide seed to those individuals (farmers) who have a signed production contract with WTG. In addition, WTG has expanded their processing facility including a powder plant for producing guar gum.
- Rhodia, Inc., Vernon, TX, (940) 552-9911, <http://www.rhodia.com> (part of the Solvay Group, Jim Reaves, manager, [jim.reaves@us.rhodia.com](mailto:jim.reaves@us.rhodia.com)) operates a processing plant which processes imported splits only. Rhodia stopped accepting U.S. production about 2007 though they still have the splitting equipment. Rhodia is currently expanding their split processing capacity by 40%, but at this time they do not plan to resume processing (splitting) U.S. grown raw guar.

In addition, three other Texas entities have guar seed interests as noted below. Among guar seed varieties in the U.S., four are older public varieties (from Texas AgriLife—Kinman, Lewis, Esser; from Arizona—Santa Cruz) and may be grown, bought, and sold without restriction or royalties. Two additional varieties, Matador and Monument are owned by Texas Tech University and are protected under federal seed law and may require a material transfer agreement or memorandum of understanding as well as royalties for transfer or sale.

- Texas Foundation Seed Service, Vernon, TX, (940) 552-6226, <http://tfss.tamu.edu>, (Steve Brown, manager, [rsbrown@ag.tamu.edu](mailto:rsbrown@ag.tamu.edu)) maintains small quantities of guar varieties that were bred in the Texas A&M System in the late 1960s and early 1970s (e.g., Kinman, Lewis, Esser). Early 2012 plans include attempting to increase seed supplies of Kinman and Lewis and purify the plants/seeds produced if needed. TFSS does not currently have any seed available for research plots or for production increases.
- Hardeman Grain, Chillicothe, TX, (940) 852-5118, (Mike Phillips, manager) is increasing a small amount of older Kinman guar seed. No seed is available in 2012.
- Texas Tech University, Lubbock, TX is the owner of two recent guar varieties which are under Plant Variety Protection Act guidelines. Matador and Monument were released in about 2005 and 2009. TTU does not currently have a seed supply, however, these varieties will be increased in 2012 from the small amounts (pounds) that are currently in storage. TTU Plant & Soil Sciences faculty contact is Dr. Dick Auld, (806) 742-5704, [dick.auld@ttu.edu](mailto:dick.auld@ttu.edu)

#### Guar Production Information Resources

Limited guar production resources from Texas AgriLife Extension Service are available online:

- <http://lubbock.tamu.edu/othercrops> This includes a current PowerPoint on guar production in West Texas as well as an old 1977 'Keys' guar production manual from the Vernon area.
- <http://southplainsprofit.tamu.edu> Texas AgriLife Extension agricultural economists annually prepare an Excel spreadsheet that includes updated irrigated and dryland guar production budgets for West Texas farmers, both irrigated and dryland. Farmers can insert their own numbers to calculate potential economic returns. Investors may review these budgets to better determine minimum 'break even' pricing of raw guar then the needed profit incentive above break-even pricing to lure production.

Contact Dr. Calvin Trostle or others in this summary for assistance for producers, businesses, potential investors, etc. to evaluate guar as a crop or a potential opportunity for involvement.

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