



Australian Government

**Rural Industries Research and
Development Corporation**

Value Chain & Market Analysis for the Australian Guar Industry

*Is Guar a potential industry for the
northern region of Australia?*

**A report for the Rural Industries
Research and Development Corporation**

by Kim P. Bryceson and Margaret Cover

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Researcher Contact Details

Dr Kim Bryceson
School of Natural & Rural Systems Management,
University of Queensland,
Gatton Campus, Gatton, Qld 4343

Phone: 07 54601617
Fax: 07 54601324
Email: k.bryceson@uq.edu.au

In submitting this report, the researcher has agreed to RIRDC publishing this material in its edited form.

RIRDC Contact Details

Rural Industries Research and Development Corporation
Level 1, AMA House
42 Macquarie Street
BARTON ACT 2600
PO Box 4776
KINGSTON ACT 2604

Phone: 02 6272 4819
Fax: 02 6272 5877
Email: rirdc@rirdc.gov.au .
Website: <http://www.rirdc.gov.au>

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Foreword

The development of a new industry based on a new crop is fraught with difficulties – not least of which is the “Chicken-and-Egg” question which is, what comes first - the development of a viable production system for the crop so that there is a product to sell, or the development of a market for the potential products associated with that crop?

Today, in this market orientated world, the tide has turned away from a production-driven industry development, to demand-driven industry development. Thus when a new crop is flagged as a potential industry winner for whatever reason/s, it is important that the potential market/s for the crop and any potential value added products, be evaluated before developmental monies get poured into something that may not have, or at best may only have a small, market potential.

This publication reports on a value and market chain analysis of a guar which is a crop that has been in the Australian production environment for over 30 years, but which has failed to develop into a viable industry. As such, guar can still be classified as a “New Crop”. An analysis of interviews conducted across potential domestic and international market chains for Australian Guar has found some significant challenges for the development of an Australian Industry, although at the same time, it has become clear that there are also some market opportunities that can be exploited if certain problems in production and marketing are addressed.

This project was funded from RIRDC Core Funds which are provided by the Australian Government.

This report, an addition to RIRDC’s diverse range of over 1000 research publications, forms part of our New Plant Products R&D program, which aims to facilitate the development of new industries based on plants or plant products that have commercial potential for Australia.

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Simon Hearn

Managing Director

Rural Industries Research and Development Corporation

Acknowledgments

We are grateful to everyone who agreed to be interviewed during this project. An interviewee and participant list can be found in Appendix 1.

Abbreviations

AFFA – Commonwealth Department of Agriculture Fisheries and Forestry, Australia

GIDA – Guar Industry Development Association

GRDC – Grains Research & Development Corporation

NIDB - New Industry Development Board

Qld DPI&F - Queensland Department of Primary Industries and Fisheries

RIRDC - Rural Industries Research & Development Corporation

UQ - University of Queensland

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Executive Summary

Guar (*Cyamopsis tetragonoloba*) is a legume often referred to as a cluster bean. It is most commonly grown in India & Pakistan where 90% of the world's production takes place. Commercial interest in guar revolves around the endosperm of the seed which is ground to produce a powdered gum used in a wide variety of products.

Research by Queensland DPI and CSIRO in the 1970s and 1980s using imported seed from India, showed that guar could be grown in the northern region of Australia relatively successfully if certain agronomic criteria were addressed. In recent times, guar has fallen out of favour with growers because despite its potential value as an addition to the farming systems rotation in northern Australia, little additional research has been undertaken to ensure consistency and hence commercial viability of the crop. The result is that currently, guar grown in Australia could at best be described as having highly variable and economically unsatisfactory yields.

From a market perspective, the only market in the late nineties was an offshore buyer of whole guar grain. Unfortunately, in 2002 this market requirement changed from whole guar grain to splits. This change from the market highlighted two problems for the fledgling industry:

1. In 2002 Australia did not have a processing facility that could split guar grain resulting in the real possibility that the only buyer of Australian guar would go elsewhere for splits
2. Having only one buyer controlling the market for a product was a major business risk to the industry.

This project was commissioned to explicitly characterise a potential Australian Guar Industry value chain and to evaluate any high value market segments that might be used to focus the development of the Australian Guar Industry's business and competitive strategy.

The investigation has shown that there are considerable challenges to developing an Australian Guar Industry – both from a production and from a market perspective. However it has also found that a number of developmental opportunities are present that suggest these challenges are not unsurmountable if they are followed through on:

1. A splitting facility has been developed in Dalby, Qld during 2004, with plans in place to further develop guar processing capability to include de-husking and guar gum powder production. An application to AFFA for New Industry Development Board (NIDB) funds to facilitate this process is being developed.
2. Alternative buyers of Australian guar splits do exist and dialogue with these players in the market would be advantageous
3. Guarmeal, because of its high protein content (>47%), is of interest to the domestic stockfeed industry and this market should be concentrated on. Research into the use of guarmeal in blends for monogastrics and ruminants a priority. Applications to the Grains Research & Development Corporation (GRDC) and AFFA (NIDB) are being considered.
4. There is recognition that developing industry standards for handling seed and growing guar would help to ensure a consistent and reliable supply of high quality guar grain to a domestic processor.

1. Introduction

1.1 General Introduction

The project was entitled “*Value Chain & Market Analysis for the Australian Guar Industry*” and was conducted between October 2003 and June 2004. Industry partners in the project were Queensland Department of Primary Industries and Fisheries (DPI&F) and the Guar Industry Development Association (GIDA)

Guar (*Cyamopsis tetragonoloba*) was first introduced into Australia in 1910 from India but little research was conducted on it as a potential crop in this country until the late 1970s and 1980s when Queensland Department of Agriculture (now Qld DPI&F) and CSIRO conducted some agronomic trials using imported seed from India and the USA (Keating & Beech 1982; Keating 1983a&b, 1984a&b, 1990; Jackson 1990, 1991; Jackson & Doughton 1982; Jackson et al 1985). The research found that guar could be grown in the northern region of Australia relatively successfully (yields of 2-3t/ha were achieved) if appropriate agronomic criteria were addressed. Further work was undertaken in the 1990s showing that leaf canopy, sowing date, row spacing and cultivar all affected guar seed and gum yield (Murphy et al, 1996a&b, Murphy, 1998).

Despite the fact that the early research showed that the climate and soils suitable for guar production are present in the northern regions of Australia, and further, that guar has been identified by the Queensland DPI&F and grain producers as a valuable addition to the farming system rotation as a soil conditioner and break crop for disease, the industry has had a chequered history. Grower inexperience with crop specific agronomic practices, inappropriate varieties, no reliable market, no in-country processor, and a general lack of competitive market intelligence as to where and how the product can be sold and for what, have limited the development of the industry to date.

The Guar Industry Development Association Incorporated (GIDA) - an association of growers, advisors and other industry participants - was formed in 2002 in an effort to foster the development of a Guar Industry in Australia. GIDA have identified that there is real interest from growers in the crop but only if suitable, reliable markets are available, if the business models and processes to access those markets can be developed and managed appropriately, and if a good information management system is in place to ensure adequate feedback from the market to enable growers to address product specifications.

Despite its history in Australia, world use of guar is increasing steadily (>2% per year) with the grain now being used variously as a vegetable for human consumption, for cattle feed and as a green manure crop. The more refined product – guar gum - has a current world market requirement for about 190,000 tonne per year which equates to approximately (depending on processor skill) to 570,000 tonne of grain. Guar gum can be further differentiated by specialised processing such that highly refined guar gum is produced for the food ingredient industry, being used as a stiffener in soft ice cream, a stabilizer for cheeses, instant puddings and whipped cream substitutes as well as a meat binder. Lower grade guar gum also has applications in cloth and paper manufacture, oil well drilling muds, explosives, ore flotation, and a host of other industrial applications.

Thus, the economic potential for the warmer, drier parts of regional Australia where guar can be grown is significant if appropriate products and markets as well as potential processing and manufacturing opportunities, can be identified.

2. Project Objectives

There were four main objectives to the project:

1. To examine and map the Australian Guar Industry value chain from production through to global distribution and final consumption
2. To identify and evaluate high value market segments that might be used to focus the development of the Australian Guar Industry's business and competitive strategy
3. To identify and develop potential business models for use in the Australian Guar Industry to maximise strategic competitive advantage
4. To recommend an Information Management strategy to facilitate a transparent and timely information flow to and from Australian growers & the market on required product specifications & business development opportunities.

2.1 Required Project Outcomes

There were three main outcomes expected from the project:

1. A detailed qualitative and quantitative overview and understanding of the guar value chain including current and future potential market segments.
2. Business models for use in the Australian Guar Industry to maximise strategic competitive advantage.
3. An Information Management strategy aimed at facilitating a transparent and timely information flow to and from Australian growers and the market.

2.2 Required Deliverables of the Research

There were three main deliverables expected from the project:

1. A Value Chain and Market Analysis Report.
2. A Workshop to facilitate information exchange.
3. An educational publication on the Guar Value Chain and future development pathways.

3. Methodology

The project had two main components - mapping and explicitly characterizing the guar value chain, and identifying and evaluating high value market segments so that they may be used to focus the development of the Australian Guar Industry’s business and competitive strategy. The following steps were taken in carrying out the project to achieve the aims and outcomes.

1. Desk top research of current literature and other public domain data on the domestic and international guar industry was reviewed to develop an overview of the regional, national and global industry sectors regarding volume, value and trends. This gave a general qualitative and quantitative description of the industry and the supply/value chains involved.
2. A value chain analysis was carried out to develop a description of the guar value chain, to identify potential high value market areas and to identify current and potential products in the domestic and export markets in relation to volume, specifications, value, and growth trends. The tasks involved and the dimensions of those tasks are listed below in Table 3.1.

Table 3.1 The value chain aspect, it’s definition, and the main tasks associated with it in a generic value chain analysis. Tasks in bold were the main focus for this project.

Aspect	Definition	Task Description
1. Industry Stakeholders & Activities	The set of processes or activities that create the attributes or products that will be demanded or used by the end user or consumer.	<ul style="list-style-type: none"> • Identify the main categories of stakeholder/trader groups, stages and activities undertaken in the transformation of a raw input into a delivered product (or service) to the end consumer. • The transformation stages may be linear and sequential but also can by-pass or be in parallel to other stages. • Where different channels exist, their significance can be indicated by volume and value passing through each.
2. Product Creation & Delivery	The product flow features of the chain.	<ul style="list-style-type: none"> • A summary level description of the main stakeholders activities undertaken and material volumes employed at each stage to allow an understanding of operations (and differences in operation) throughout the delivery channels. • A critical issue in managing the product flow in a supply or value chain is managing slack or flexibility and supply chain interdependencies to accommodate unexpected interruptions or events.
3. Financial Conditions	The financial or cash flow across the participants and processes.	<ul style="list-style-type: none"> • A simple ‘value analysis’ is to take some sample products and illustrate how value and costs are accumulated (and margin gained) throughout the transformation stages. • Electronic funds transfer technology has improved the efficiency of financial and funds flows compared to earlier systems of billing and cheque writing.
4. Information Conditions	The information flow across the chain.	<ul style="list-style-type: none"> • Determine the information flows across the chain. Important elements are the accuracy of messages (whether messages are signals or noise), the strength of these messages, the cost of messaging, the speed of transmitting and receiving messages, and the openness to sharing rather than retaining critical information among participants. An additional element and often a source of conflict, is the sharing of financial performance info across the stages & chain participants
5. Incentives, Motivators and Drivers	The incentive systems that are in place to drive and reward performance and share risk.	<ul style="list-style-type: none"> • ID the underlying drivers of value and costs between the stages. • Incentives systems might include price premiums, profit sharing, minimum pricing arrangements, window contracts, cash flow or financial assistance contracts, loan guarantees, qualified supplier recognition programs, cost-sharing arrangements, long-term commitments, and knowledge or market access.
6. Governance Conditions	The chain governance / coordination system. This significantly influences who has power and control in a value chain and how risks & rewards are shared.	<ul style="list-style-type: none"> • Describe the type of governance or coordination systems accommodated within the industry between trading parties. • This could include open-access markets, various forms of contracts, strategic alliances, joint ventures, franchising arrangements, networks and cooperatives, and vertical ownership.

3. The primary data collection mechanism was a survey via face-to-face interviews with representative stakeholders in the current Guar Industry chain, both domestically and internationally, to examine the components of the chain to determine which of those components may potentially be possible to develop further in Australia.
 - A questionnaire was developed for producers using a “What”, “Why”, “How” framework (what is it, why is it so, how can it be addressed) to investigate some of the issues that they had faced in growing guar in Australia to date (Appendix 2). (*12 Growers were interviewed*).
 - A similar framework was used to construct a less structured approach to interviewing post farm-gate members/potential members of a guar industry chain. This was because there was strong anecdotal evidence to suggest that Commercial-in-Confidence issues would prevent appropriate responses to a structured survey instrument. (*33 Interviewees*).
4. The value chain was mapped identifying drivers, barriers, the information supply chain, current value-add components and potential areas for new business development.
5. A brochure entitled “*Is Guar a Potential Industry in Queensland*” was developed using information gathered during the project. Design was undertaken by the UQ Desktop Publishing Department located at Gatton Campus. Printing was outsourced (Appendix 3).
6. A workshop was run at UQ’s Gatton Campus on July 14 2004 to disseminate project results and to involve potential industry chain members in discussions on developing an Australian Guar Industry. The Workshop Agenda and Invited Speaker List and Outcomes Table are shown in Appendix 4.

4. Guar

Guar (*Cyamopsis tetragonoloba*) is a grain legume often referred to as a cluster bean (Figure 4.1). It is most commonly grown in India & Pakistan where 90% of the world's production takes place. Commercial interest in guar revolves around the endosperm of the seed which is ground to produce a powered gum used in a wide variety of products.

Figure 4.1. Guar (*Cyamopsis tetragonoloba*) in various forms.



Countries other than India and Pakistan that produce guar include the Sudan, Argentina, USA (Texas), South Africa and Brazil with China increasing production from ~3,700 tonnes in 1996 to 35,000 tonnes/annum currently.

NB The most useful reference text on world wide guar production and history is the 1979 book by R.L Whistler and T. Hymowitz of Purdue University entitled "Guar: Agronomy, Production, Industrial Use and Nutrition" published by Purdue University Press: West Lafayette, Indiana, and available in the CSIRO Library.

4.1 Guar Products and World Market

The world guar market is a mature one and increasing steadily (>2% per year). The plant is used variously as a vegetable for human consumption, for cattle feed and as a green manure crop. Guar grain is normally processed into three main products – Guar Meal, Guar Splits (dehusked) and Guar Gum:

1. **Guar Meal** is regarded as a natural animal food supplement in its own right with high protein levels (>47%), but is also used as a binder for other feeds.
2. **Dehusked Guar Splits** are the raw product used to create the more refined value add product – guar gum. Dehusking requires sophisticated processing capability with the price of the product being dependent on the splits meeting specifications laid down by buyers for moisture content, density, protein content, impurities and particle size. Example specifications required of guar gum splits are shown in Table 4.1.

Table 4.1. Example specifications required of guar gum splits (from Shree Ram Gum Company (RamcoL Series, 2004))

Attribute	Specification
Gum Content	80-85%
Dehusked Splits	90% Minimum
Protein	5% Maximum
Ether Extract	0.6% Maximum
Ash	1% Maximum
Moisture	10% Maximum
Crude Fibre	1.5% Maximum
Degree of refining	Double refined

3. **Guar Gum** is a natural vegetable gum which has a number of features that create value – in particular it has a high natural viscosity due to its molecular structure which can be enhanced by processing, it is cold water soluble, can be rapidly hydrated and is freeze thaw stable. The current world market for guar gum is for about 190,000 tonne per year which equates to approximately (depending on processor skill) to 570,000 tonne of grain.

Guar gum can be further differentiated by specialised processing such that highly refined guar gum is produced for the food ingredient industry, being used as a stiffener in soft ice cream, a stabilizer for cheeses, instant puddings and whipped cream substitutes as well as a meat binder. Lower grade guar gum also has applications in cloth and paper manufacture, oil well drilling muds, explosives, ore flotation and a host of other industrial applications.

Specifications vary as per buyers' requirements but mesh (particle) size, viscosity, pH and for food grade guar gum, microbiological standard are all important attributes. Example guar gum specifications for the food ingredient and personal care industries are detailed in Table 4.2.

Table 4.2. Example chemical and physical specifications required of guar gum for the Food Ingredient and Personal Care industries (from Swift & Company Ltd, 2000, Rhodia Inc, 2004)

Attribute	Specification/Values
Sieve Analysis	
Retained on BSS 100 Mesh	Traces
Retained on BSS 200 Mesh	7% Max
Passed thru BSS 200 Mesh	92% Min
Viscosity (1% solution cps)	Brookfield RVT at 25 ⁰ C, 20 RPM
Cold Viscosity 2hrs	3500-4200
24hrs	Not less than 2 hrs (stable)
Hot Viscosity 2hrs	4300-4800 (5000-6000 now common)
Analytical indication	
Polysaccharide (gum content)	80% Minimum
Loss on drying (5hr, 105 ⁰ C)	10-12% Maximum
Ash Content (5hr, 700 ⁰ C)	1% Maximum
Protein (N-content x 6.25)	4.5% Maximum
Acid Insoluble Residue (AIR) (crude fibres)	3% Maximum
Fat Content	0.5% Maximum
pH (1% solution in distilled water at 25 ⁰ C)	5.5-6.5
Micobiological Standard	
Total plate count	5000 cfu/gm Maximum
Yeast	500 cfu/gm Maximum
Moulds	500 cfu/gm Maximum
E.Coli	Absent
Salmonella	Absent

The USA is the largest consumer of guar gum with an annual consumption of ~45,000 tonnes which represents ~ 25% of world trade. Germany & Japan consume another 23% between them with the UK, Denmark and the Netherlands combining to take a further 22% of world trade. An area of growth is in Asia and South America as standards of living increase resulting in the increased consumption of processed food.

5. Australian Guar Agri-Industry development

5.1 Agri-industry Supply and Value Chains

The agri-industry sector worldwide is a large, multifaceted industry sector comprising businesses that create industry specific agri-industry chains that often exist across international boundaries. Businesses in such chains include:

- Input Suppliers (*e.g. Agricultural Chemical and Fertiliser companies such as Incitec/Pivot*);
- Service Providers (*e.g. Banks, R&D organisations, Governments, Consultants*);
- Producers (*e.g. Growers of Grain, Meat, Dairy, Cotton, Fruit, Nuts, etc*);
- Traders (*e.g. Mitsubishi, Australian Wheat Board, ConAgra, etc*);
- Processors (*e.g. Associated Grain, Danisco, Parmalat, etc*);
- Manufacturers (*e.g. Food processing companies such as Kraft, Mars, Unilever*);
- Retailers (*e.g. Supermarkets such as Woolworths and Coles as well as smaller retail outlets*);
- Logistics (*e.g. Transport and storage companies*).

The major issue for agri-industries is that they deal in low margin commodities where competitive market forces have typically resulted in the cost of production being very close to the value created, thus leaving relatively thin profit margins (Boehlje, 1999). Further, production is directly affected by climate and the resulting weather which is notoriously fickle and very often results in a variable supply of raw product. Ensuring constant volume, high quality product at the right time and price is a driving business force in domestic and international agri-industry chains.

As a result, supply and value chain analysis of agri-industry chains has become a valuable tool in determining where added competitive advantage can be generated for these industries (O'Keefe, 1998, Dunne, 2001).

5.2 Guar Value Chain Analysis

While the fundamental concept of a value chain is not complex, explicit characterisation and mapping of the value chain is important for any subsequent quantitative / qualitative analysis. As a guar value chain does not essentially exist in Australia currently, it was necessary to track the potential chain back to the raw material and then work through the history of guar production in Australia as well as the past attempts of industry development before proceeding to work through the potential stakeholders in the chain to identify:

- The set of processes or activities that would create the attributes or products that might be demanded or used by the end user or consumer
- The product flow features of the chain
- The financial or cash flow across the participants and processes
- The information flow across the chain
- The incentive systems that are/should be put in place to drive and reward performance and share risk
- The chain governance / coordination system.

6. Growing Guar in Australia

6.1 History and Agronomic Activity

Guar was first introduced into Australia in 1910 from India with the first research being conducted into it as a potential summer growing grain legume in Queensland taking place between 1953 and 1963. This early research indicated that while guar was a possible candidate as an addition to rotations on light textured soils, it was not likely to be a commercially viable crop.

No further research was conducted on Guar in this country until an upsurge in the use of guar gum in the oil industry during the 1970s created a world shortage of the gum. Australia was targeted as a potential producer of guar grain by 'The Celanese Company' whereupon the Queensland Department of Agriculture and CSIRO became involved in conducting a number of trials using imported seed from India and the USA to determine the agronomic criteria necessary to grow the crop successfully (Keating & Beech 1982; Keating 1983a&b, 1984a&b, 1990; Davey, et al 1984, Jackson 1990, 1991; Jackson & Doughton 1982; Jackson et al 1985).

The research found that guar could be grown in the northern region of Australia relatively successfully (yields of 2-3t/ha were achieved), that it was a good soil conditioner in terms of improving texture and increasing soil nitrogen (>70kg/ha) and could act as a significant disease break and as an excellent forage crop. However the research reports of the day made it clear that there were a number of agronomic management issues that needed to be addressed, including:

- Inoculation of seed is necessary to increase the nitrogen-fixing potential of the roots;
- Nutrition in the form of Phosphorous and Zinc + trace elements is required (placed below the seed for best results);
- Weed control - guar is vulnerable to early weed growth and thus competition;
- Water requirement - guar is a drought tolerant plant but for effective cultivation it needs rain before sowing, again before the crop buds out and then when blossoming starts. Good sunshine and dry weather are required during harvesting;
- Soils - free draining, friable soils that have some waterholding capacity give best results. Irrigation on sandy soils gives optimum yields;
- Waterlogging - guar is highly susceptible to waterlogging which causes nodulation loss and nitrogen stress as well as severe root breakdown;
- The structural features of heavy clay soils appears to cause root penetration and nutritional problems. When the structure of these soils is disturbed, these constraints are removed;
- Pests & Diseases - the podsucking bug (*Riptortus serripes*) is a known pest and the fungus diseases *Alternaria cucumerina* and *Sclerotium rolfsii* are also known to cause problems.

6.2. Current Guar Production situation in Australia

As a result of interviewing twelve recent or current growers of guar from the last 5 years (including 2004), the main conclusions that can be drawn about growing guar in Australia are that there have been many perceived reasons for growing it (Table 6.1), with the most common ones being associated with its use as a rotational / soil improvement crop. However, any advantages gained have been outweighed by production problems (Table 6.2) leading to low, variable yields (0.3-0.7 t/ha) from the current guar varieties being grown. A further issue raised was that it was more economical and less problematic to grow other crops such as sorghum when only low yields were forthcoming from guar. Table 6.3 shows a Gross Margin comparison for guar and sorghum for different yields of guar.

Table 6.1. Reasons why growers have been growing guar to date in Australia.

Reason/ Grower	Fits Rotation	Disease Break	Improves soil	Few Pests	Adds N	Low cost crop	Withstands Dry	Yield	Forage
1	x			x		x			
2	x	x	x	x			x		
3		x	x					x	
4	x	x	x	x	x				
5	x	x	x	x	x				
6			x	x	x				x
7	x			x					
8		x			x				
9			x	x	x		x		x
10			x				x		x
11	x		x				x		
12									
TOT	6	5	8	7	5	1	4	1	3
	50%	42%	67%	58%	42%	8%	33%	8%	25%

Table 6.2. Problems identified by growers in growing guar. Two growers additionally sited poor price as an issue.

Problem / Grower	Poor ROI	Seed Qual	Pests	Unsuitable soil type	Uneven crop	Hard seed	Harvest problems	Regrowth	Poor Agron Info	Poor Plant Estab	Water logging
1		x	mirid virus						x		x
2	x	x		x	x	x	x	x	x		
3	x	x		x			x		x		
4	x	x	mirid		x	x	x		x		
5	x	x	x				x		x		
6	x				x			x			
7	x	x		x		x	x	x	x	x	
8											
9		x			x		x	x	x		
10	x			x	x						x
11	x	x		x					x	x	
12	x	x		x	x		x		x	x	x
TOT	9	9	2	3	8	3	7	4	9	3	3
	75%	75%	17%	25%	67%	25%	58%	33%	75%	25%	25%

Table 6.3. Gross Margin Analysis for guar vs sorghum. Sources: Strahan,R.2001. Gross Margins, Guar Workshop, Roma; <http://www.nre.vic.gov.au/trade/asiaveg/nlaav-15.htm> - Urea as a percentage of Nitrogen - 46%; Australian Grain Accumulation - Sorghum delivered Dalby 2003-2004 - \$162 (average); Landmark - Urea price: \$517.00/tonne.

	Guar	Sorghum	Guar	Sorghum	Guar	Sorghum	Guar	Sorghum	Guar	Sorghum
Gross Income										
Price /tonne (delivered Dalby)	\$330.00	\$162.00	\$330.00	\$162.00	\$330.00	\$162.00	\$330.00	\$162.00	\$330.00	\$162.00
Yield (t/ha)	0.3	2	0.7	2	1	2	2	2	2	2
.66t/ha @ \$330 (graded seed)	\$217.80		\$217.80		\$217.80		\$217.80		\$217.80	
.04t/ha @ \$250 (gradings)	\$10.00		\$10.00		\$10.00		\$10.00		\$10.00	
Gross Income(\$/ha)	\$89.00	\$324.00	\$221.00	\$324.00	\$320.00	\$324.00	\$650.00	\$324.00	\$650.00	\$324.00
Variable Costs										
Fallow Spraying (incl application)	\$16.30	\$16.30	\$16.30	\$16.30	\$16.30	\$16.30	\$16.30	\$16.30	\$16.30	\$16.30
Seed (incl application)	\$23.21	\$21.63	\$23.21	\$21.63	\$23.21	\$21.63	\$23.21	\$21.63	\$23.21	\$21.63
Fertiliser (incl application)	\$23.20	\$40.70	\$23.20	\$40.70	\$23.20	\$40.70	\$23.20	\$40.70	\$23.20	\$40.70
Herbicide (incl application)	\$25.03	\$39.14	\$25.03	\$39.14	\$25.03	\$39.14	\$25.03	\$39.14	\$25.03	\$39.14
Insecticide		\$13.25		\$13.25		\$13.25		\$13.25		\$13.25
Aerial Spraying		\$12.50		\$12.50		\$12.50		\$12.50		\$12.50
Preharvest Spray		\$10.00		\$10.00		\$10.00		\$10.00		\$10.00
Harvesting	\$60.00	\$45.00	\$60.00	\$45.00	\$60.00	\$45.00	\$60.00	\$45.00	\$60.00	\$45.00
Total Variable Cost	\$147.74	\$198.52	\$147.74	\$198.52	\$147.74	\$198.52	\$147.74	\$198.52	\$147.74	\$198.52
Gross Margin (\$/ha)	-\$58.74	\$125.48	\$73.26	\$125.48	\$172.26	\$125.48	\$502.26	\$125.48	\$502.26	\$125.48

6.3 Challenges to growing Guar in Australia

From these grower responses, a number of challenges and possible solutions associated with growing guar in Australia were identified and are described below.

1. Poor agronomic information availability

Most growers interviewed (75%) felt that the information that they had obtained when deciding to grow guar, did not accurately address the agronomic problems they ended up facing. On analysis of what the growers were doing and what the original science had recommended, it was concluded that some key criteria were not being adequately addressed in the sales pitch to growers because of the need to get growers involved in developing an industry.

- ✓ **Proposed Solution:** Guar Industry Development Association (GIDA) Website to be developed & maintained with quality up-to-date information on agronomic science and management relating to Guar.

2. Multi-variety lines and indeterminate maturation

Almost all growers (83% and additional anecdotal evidence) complained about multi-variety lines from apparently single variety seed as well as indeterminate maturation as being major problems that needed to be overcome. Further investigation showed that the two main early guar varieties trialled, (CP177 and Brookes), were not necessarily pure single variety sources when imported into Australia (K. Jackson, pers com, 2004), but in addition, these two varieties had been inadvertently mixed at the seed multiplication stage (C. Proud, pers com, 2004) with further poor seed husbandry after this contributing to an ongoing problem.

- ✓ **Proposed Solution:** Research into varietal plant breeding that addresses market needs of high yield & high gum content should be undertaken. *It should be noted that a RIRDC / Qld DPI&F project ongoing during this project (Project No: DAQ-286A) has been looking at isolating 1 - 4 high yielding varieties suitable for growing in Australia from over 400 varieties residing in the seed bank at Biloela, Central Qld. Two other, private selection trials by growers are currently in the final year.

3. Dirty seed & poor germination

A major source of discontent amongst growers (75% and anecdotal) was “dirty” seed (guar seed mixed with other varieties – notably sorghum, lablab and wheat) and poor germination (15% - 47% - 57% - 80% were some measured percentages). Dirty seed is a problem associated with poor seed collection methods. Poor germination is more difficult to determine a cause for but as this varied quite dramatically from grower to grower it would seem likely to be linked to seed collection, storage and length of time in storage at inappropriate temperatures (one example given was seed that was stored in bags in a garage in Brisbane in unfavourably hot and humid conditions). At A\$1200-500/t this is not acceptable, nor from an industry perspective, is it viable.

- ✓ **Proposed Solution:** GIDA to establish standards for clean, certified seed including multiplication, collection and storage as is normal business practice for other grains.

4. Inappropriate nutrition & “Iffy” soils

It was found that a wide variety of production strategies were being attempted in growing guar - growers had been told that guar was a desert plant that survived drought, was quite happy on sandy soils and did not require much nutrition, if any - and thus was suitable for ‘marginal country’. Additionally, seeding rates varied from 4kg/ha to 15kg/ha with variable row spacing, while some growers had also tried growing guar on quite heavy clay soils with varying degrees of success and disease levels. It was concluded that a lack of clear, consistent information which followed the original research recommendations was not filtering through to the growers.

- ✓ **Proposed Solution:** Better informed growers via DPI&F and GIDA Websites which should maintain quality up-to-date information on agronomy and management relating to Guar.

5. Weed problems can be catastrophic

Guar is vulnerable to early weed growth and thus competition. In no till environments this necessitates a pre-emergent herbicide. Currently there are no registered herbicides for guar.

- ✓ **Proposed Solution:** Investigate minor use registration of appropriate herbicide

6. Cost/benefit competition with other crops

At 0.3-0.7 t/ha guar does not provide a satisfactory gross margin on current input costs to be economically viable compared to other crops such as sorghum.

- ✓ **Proposed solution:** Aim for at least 1-2 t/ha yields by addressing above challenges.

THE BOTTOM LINE

QUESTION: From an industry perspective - can Australia grow enough guar grain each year to provide a reliable supply to the market?

ANSWER: YES – but only if the above challenges can be overcome

7. Australian Guar Products and Market

There are no domestically produced guar products sold within Australia at the present time. However, 3,000 tonne/yr of powdered guar gum (~A\$6,000,000) is currently imported into Australia mainly for use in the food ingredient, mining (nickel sulphide flotation), oil and gas (fracturing and drill muds), personal care product (bath and shower gels) industries and the industrial ingredient (agrochemicals) industry.

Companies importing, supplying or using guar gum powder in Australia include: Rhodia Inc, Woods & Woods, Chemiplas, Halliburton, Western Mining, Parmalat/Pauls, Danisco, Kerry Food Ingredients, Masterfoods, Procter & Gamble, Goodman Fielder.

Companies interviewed during this project that either handle or use guar products indicated a lack of knowledge that Australia grew/could grow guar. Two products from domestic sources that were identified by buyers as being potentially interesting to them were guar meal and dehusked guar splits of appropriate specifications – but only if supply could be guaranteed.

Domestically produced guar gum powder was of little or no interest to guar gum powder buyers because of already established auditable/traceable and trusted supply arrangements for highly specified gum powder. However if a high viscosity gum powder (>6000 cps) could be produced domestically, this would be regarded favourably.

7.1 Industry Development

Despite guar's agronomic potential, an Australian guar industry did not develop in the 1980s mainly due to a significant drop in world oil prices which in turn reduced the world's requirement for guar gum and thus the raw grain. Both Qld Department of Agriculture and CSIRO closed down their guar programs, leaving only a single PhD project ongoing in the 1990s at UQ which completed some work showing that leaf canopy, sowing date, row spacing and cultivar all affected guar seed and gum yield (Murphy et al, 1996a&b, Murphy, 1998).

Interest in growing guar flared again in the late 1990s when Lamberti s.p.a. an Italian chemical company using guar among other materials to create derivatives for use in specialist markets such as the Textile, Leather, Oil, Photocuring, Coating, Paper, Ceramics, Cosmetics, Detergents, and Agrochemical industries, decided to investigate Australia as a secondary source of guar (their primary source being India).

Lamberti's stated intent in investigating a secondary source of guar was that it was a strategy to combat the very variable product availability and associated price instability (generally associated with major price speculation) that was / is a feature of the world guar market dominated by India in the Northern Hemisphere. An example of this variability is shown in Table 7.1 which details areas under cultivation, production, yield and price for India over the 1998/99 season to 2002/2003 seasons.

Table 7.1. Indian guar production and price variability 1998/99 – 2003/2004 (from National Commodity & Derivatives Exchange: www.ncdex.com). Rows “Area under cultivation” and “Production” refer to Rajasthan.

Details / Yr	98/99	99/00	00/01	2001/02	2002/03	2003/04 Target
Area under cultivation *100,000 ha	16.12	26.48	30.56	24.13	5.56	20
Prod *100,000 t	3.2	2.32	4.81	7.63	0.28	6
Yield kg/ha	NA	NA	NA	316	50	300
India Prod *100,000 t	4.5	3.31	6.81	10.9	0.4	8.57
Value INR A\$*	4,950,000,000	3,640,000,000	7,490,000,000	11,990,000,000	440,000,000	9,420,000,000
(.029841)	147,713,940	108,621,968	223,5100,588	357,795,988	13,130,128	281,104,104

Recognising the variability in guar production in the main growing regions of the world, is an important component of understanding a potential guar market for Australian guar. Variable climate and resultant variable production is part and parcel of agriculture the world over – but in particular monsoonal activity in India is a major factor in guar price speculation which starts months before any production variances are seen to be occurring. In addition, it is not uncommon that a good season results in a substantial amount of product hoarding to artificially inflate prices when product is available and ensure a sale when it is not.

A ‘Buyer Wishlist’ of criteria for a secondary source of guar if primary sources are in the Northern Hemisphere was compiled from interviews of buyers/suppliers of guar. Requirements are:

- ✓ Source region would ideally be in the Southern Hemisphere
- ✓ Source region ideally would have optimal rains
- ✓ Temperature should never go below 15⁰C during the growing season
- ✓ It must be dry towards the end of the season with plenty of sunshine
- ✓ A guar splits processing facility in the same region as guar is grown in would be beneficial
- ✓ An outlet for guar meal near to the growing /processing region would be useful
- ✓ The growing region should be close to a port
- ✓ The growing region should have stable politics
- ✓ High productivity (fully mechanised production) would be regarded highly
- ✓ The country/region would ideally have low labour costs

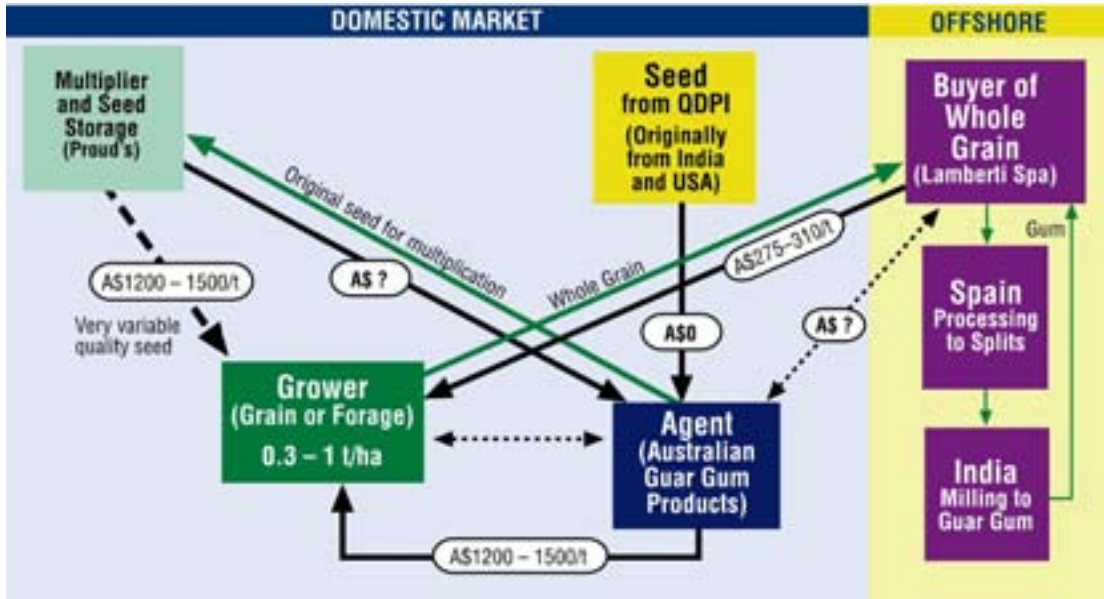
Despite Queensland not satisfying all these criteria, notably optimal rains and low labour costs, Lamberti s.p.a. in the mid-late 1990s, approached Australian Guar Gum Products Pty Ltd ((AGP) - a Sole Trader with previous experience of attempting to establish an Australian Guar Industry), to act as an agent or coordinator between themselves and Australian growers. AGP was to establish contact with potential growers with the view to persuading them to become involved in the production of guar – mainly in the region around Roma in Queensland.

Seed was obtained from the Qld DPI&F seed bank at Biloela and Indooroopilly by AGP for multiplication, and a limited number of growers were contracted directly to Lamberti s.p.a. who agreed, since there was no splitting facility in Australia, that they would accept whole grain directly from the growers. Lamberti also agreed that they would carry the costs for sending the grain onto Spain for splitting and then to India for further processing to the guar gum powder they required (Figure 7.1).

During this period, growers reported a disappointment with the percentage of grain that was graded second class (upto 15% reported) which meant that when combined with the low yields being experienced, many were significantly out of pocket and became wary as to whether to grow guar again.

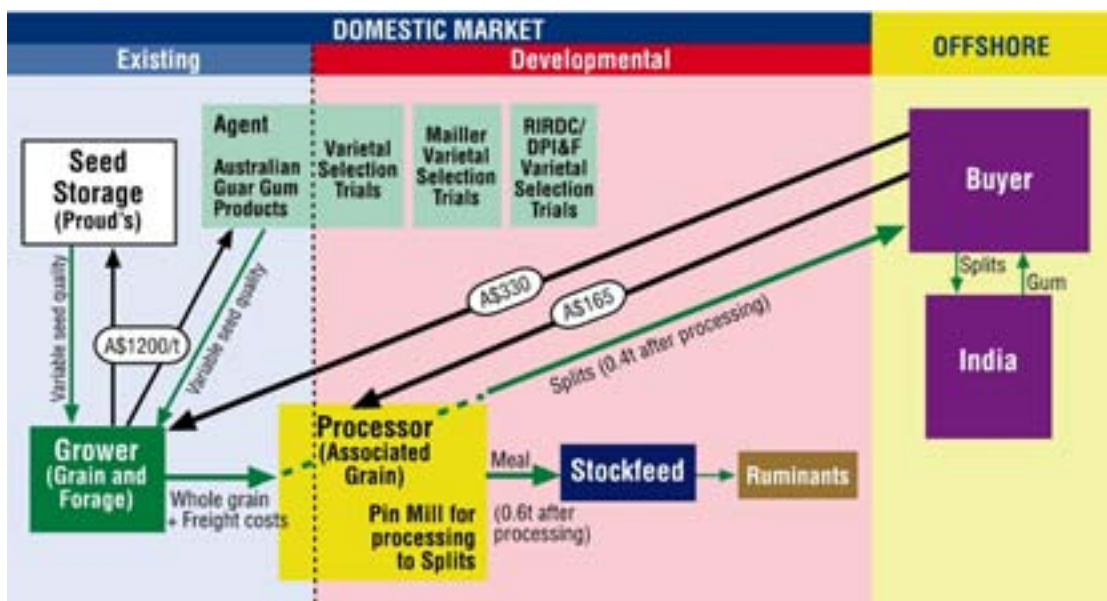
In 2002 Lamberti s.p.a. informed AGGP and growers that they were now requiring guar splits rather than whole grain which created concern given the lack of a splitting facility in Australia. Lamberti then agreed to work with Associated Grain in Dalby as a research partner in developing a splitting facility in Queensland. In so doing Lamberti also agreed to take unhusked guar splits until the appropriate dehusking processing capability had been developed, after which they would require dehusked splits. They indicated in early 2004 that they would be looking to handle at least 5000 tonnes of grain processed to dehusked splits from Australia.

Figure 7.1. Pre 2004 Australian Guar “Industry”. (Growers had direct supply contracts with Lamberti s.p.a. with prices ranging from A\$275-310/t depending on quality).



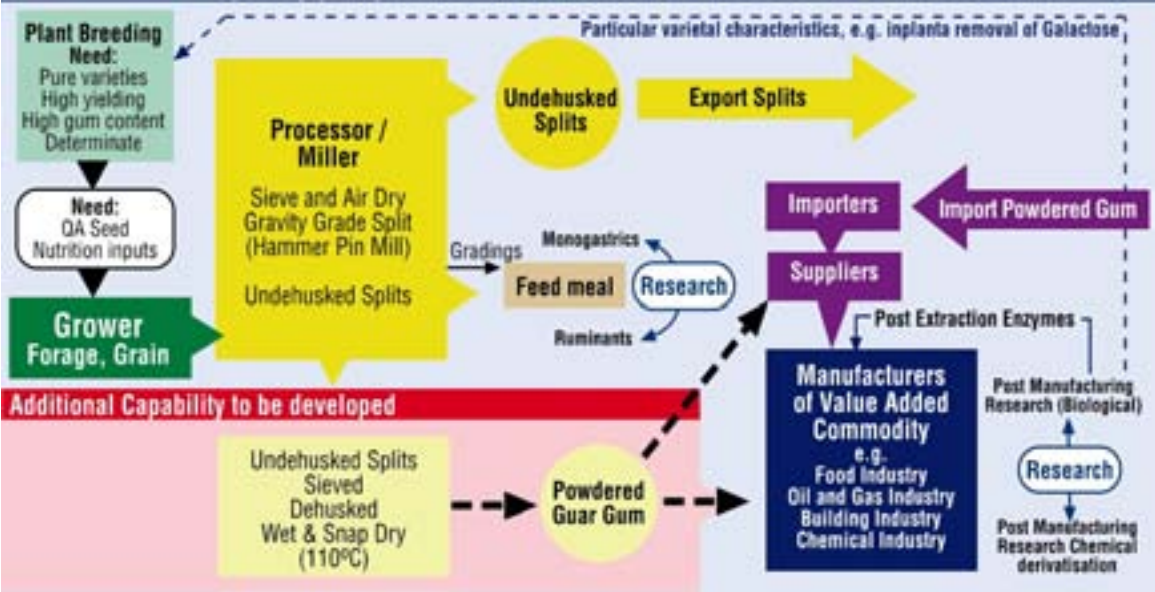
In 2004 Associated Grain at Dalby in Queensland imported a Hammer Pin Mill from India as the first stage of developing a guar splitting facility. Working with Lamberti with limited amounts of guar grain, due to both the ongoing drought conditions during the 2002, 2003 and 2004 seasons, but also a lack of grower confidence in the crop and market, the skilling up process of producing undehusked splits commenced. Figure 7.2 shows the 2004 Australian Guar Industry product flow with associated financial flows between participants in the developing industry as well as figures that indicate the wastage associated with this early preliminary processing. From one tonne of guar grain only 0.4t of undehusked splits of applicable quality was being produced, the remainder being consigned to guar meal. In a mature processing plant the wastage to guar meal should be significantly less (~0.35t) with between 0.65 and 0.75 tonne of appropriate grade dehusked splits being considered acceptable.

Figure 7.2. The 2004 Australian Guar Industry product flow



This first stage of processing is, as of mid-2004, still being worked on with further research and processing development forecast to take place in late 2004. The aim is to work towards good quality dehusked splits by the 2005 season and full guar gum powder processing as soon as possible after that. Figure 7.3 shows the current Australian Guar Industry situation and developing capability requirements.

Figure 7.3. The 2004 Australian Guar Industry situation and developing capability requirements



8. Implications

8.1 Market Challenges & Opportunities for Australian Guar

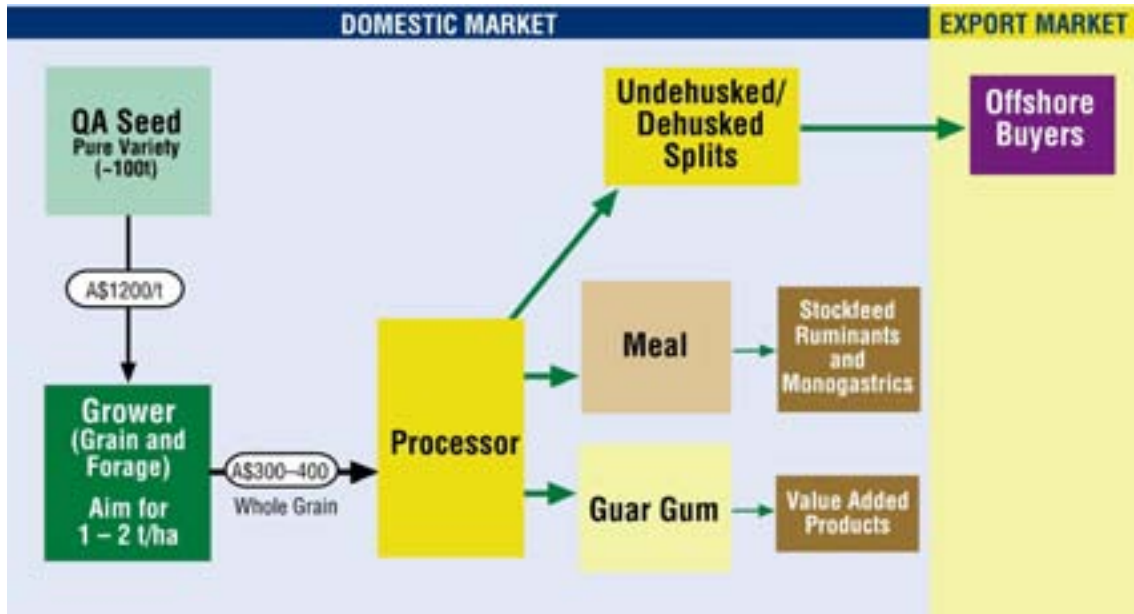
On the face of it, there is no doubt that there are many challenges associated with developing a market for Australian guar products. First and foremost is the need to be able to produce a consistent supply of guar grain that is economically viable to growers and trusted by buyers. Secondly there is the need to develop processing skills in producing dehusked splits and eventually powdered gum, that address the required standards of buyers – always remembering that the grain/splits is simply a commodity to be acquired at the best possible price. Supposed selling strengths associated with Australia such as “clean green” and “loyalty to Australian products” simply do not apply. Market challenges can be listed as:

1. Guar both as a grain and gum is a simple commodity but has a highly competitive & established market dominated by India which supplies most of the world.
 - This means that markets for Australian guar will be limited and difficult to establish.
2. Industries that use Guar gum use it in preference to all other equivalent gums and need an assured and consistent supply of highly specified product.
 - Suppliers have stated that they require proven consistency of supply with strict QA standards and traceability. No food ingredient grade guar gum buyer interviewed would consider buying Australian guar gum powder until it was a proven high quality consistent product.
3. Processing guar grain to gum of appropriate specifications for different market sectors is a skill that is not currently present in Australia.
 - This knowledge and hands-on skill development needs to be addressed if the industry is to meet market requirements, particularly in the high volume food ingredient industry.
4. Currently the only market for Australian Guar is for grain splits and this market is controlled by a single off-shore buyer. While this buyer (Lamberti s.p.a.) have confirmed support for the fledgling industry in Australia, this single buyer situation remains a *high risk situation* around which to build an industry and other buyers should be sought for long term industry viability.
5. There is a lack of knowledge and transparency of information regarding potential markets, product pricing and specification requirements amongst current Australian guar industry participants.
 - Need to develop, maintain and disseminate up-to-date market information via the Guar Industry Development Association (GIDA) Website.

Despite these hurdles to overcome, it became clear during this project that there are a number of potential opportunities for a developing guar industry in Australia (Figure 8.1). These opportunities can be listed as:

1. All guar gum powder used in Australia is currently imported (@ ~10c/kg landed).
 - A potential domestic market therefore could exist in the Mining, Personal Care and Industrial Ingredient industries (e.g. in agrichemicals, guar is used as an adjuvant). As stated, the food ingredient market is not a realistic one to aim for in the early stages of industry development.
2. Associated Grain, (Dalby, Qld) is currently developing a splitting capability with future development plans for guar gum powder processing.
 - Dialogue with alternate buyers of Australian guar products for e.g. Rhodia Inc, needs to be established to minimise single buyer risk.
3. Guar meal is an excellent source of protein for processed stockfeed. *A focus should be on developing this product and the domestic market associated with it.*

Figure 8.1. The Post 2004 potential Australian Guar Industry product potential



THE BOTTOM LINE

QUESTION: Guar is a commodity—why should current suppliers buy Australian Guar?

ANSWER: The seasonal difference in availability compared to the northern hemisphere is a positive, BUT it will only happen if Australian guar proves to have a consistent high quality, traceable, GM-free supply – and costs the same or less than current sources

9. Recommendations

As discussed elsewhere in this Report – there are two major obstacles to overcome in developing a successful Guar Industry in Australia. These are developing the agronomic capability to grow significant quantities of guar grain consistently, and developing the processing skills and facilities in Australia to provide the processed products of dehusked guar splits, guar meal, and guar gum powder.

It must be recognised that while the following recommendations are made with the understanding that current guar industry participants are enthusiastic in their desire to develop the industry further, the current agronomic and economic situations of the industry as described in this report indicate that creating a competitive, consistent and viable industry will be extremely difficult in Australia.

It is concluded that successful industry development will only be achieved by stringent, transparent “Best Practice” agronomic and process management and the adoption of innovative business models.

The recommendations from this study are:

- 1) A consistent supply of product in the region of 10-15,000 tonnes of Grade 1 guar grain per year is recommended for the industry to be viable in the long term. To achieve these tonnages it is recommended that:
 - i) Funded research will be needed on commercially viable plant varieties to eliminate the current multivariety and disease problems and associated variable yields;
 - ii) Standards and appropriate certification should be established for multiplication, collection, storage and supply of seed as is normal business practice for other grains;
 - iii) Best Practice agronomic management practices in relation to guar production must be developed and the information made generally available;
 - iv) Funded research should be undertaken on the economic value of guar as a soil nitrogen fixer in comparison to an established crop such as *Dolichos lablab* – as well as into phosphorous placement to maximise root fertilizer contact.
- 2) A Website controlled by GIDA should be developed that is continually updated with quality controlled up-to-date information regarding agronomic and market issues.
- 3) In order to develop the market for Australian guar products it is recommended that:
 - i) A GIS-based land suitability exercise be undertaken to target areas that will support the production of guar outside the current regions and thus facilitate the growth of the industry. The current average acreage under guar by those who grow it is ~50 ha. To achieve an initial target of 5000 tonnes based on this, some 100 growers will be required if yields of 1 t/ha can be achieved. Greater hectareage under production and better yields would allow a long term tonnage of 10-15 tonnes to be aimed for which will be necessary for the industry to be sustainable over time;
 - ii) Funding should be applied for by GIDA to employ an Industry Development Officer to be responsible for setting up the Information Website, expanding the area under guar cultivation and for general business and market development;
 - iii) Alternative buyers such as Rhodia Inc do exist for Australian guar products and establishing dialogue with Rhodia and other players would be advantageous.
- 4) The splitting facility at Associated Grain in Dalby should be supported for further processing development through an application to New Industry Development Board (NIDB) funds.

- 5) Guarmeal, because of its high protein content (>47%), is of interest to the domestic stockfeed industry and this market should be *strongly* concentrated on.
 - i) Research into the use of guarmeal in blends for monogastrics and ruminants a priority. Applications to the Grains Research & Development Corporation (GRDC) and AFFA (NIDB) should be considered.

- 6) Alternative legal structures such as a Cooperative or Joint Venture involving current Guar Industry participants should be investigated with Qld State Development to preserve Intellectual Property already invested in getting the industry to the current stage of development.

Appendix 1 - List of Interviewees

Interviewee List

Surname	Name 1	Company	Address 1	Address 2	Postcode
Baker	Garry	Danisco (Regional Director)	45-47 Green St	Botany	NSW2019
Beech	Don	Breeder	Lagoon Crescent	Bellbowrie	Q4070
Blockey	Justin	Pixi Icecreams	Toowoomba		QLD
Bright	Gavin	Grower	Oaklyn	Surat	Q4417
Carrigan	Graham & Mary	Farmer	Palm Grove	Moura	Q4718
Coggan	Geoff & Rosie	Farmer	Wongle	Meandarra	Q4422
Doughton	John	DPI&F (Principal Agronomist)	DPI Tor Street	Toowoomba	Q 4350
Douglas	Col	DPI&F (Plant Breeding)	DPI	Biloela	Q4715
Fletcher	Rob	UQ	University of Queensland	Lawes	Q4343
Fuller	Graham	QCL	70 Neill Street	Toowoomba	Q4350
Gidley	Michael	UQ	University of Queensland	St Lucia	Q4067
Girlie	Graham	Grower	Al Fresco	Injune	QLD
Groat	Ben	Grower	Elvanbrook, MS 41	St George	QLD
Helkin	Jacui	Swift & Co	Hendra	Brisbane	QLD
Hoskin	Brenton	Better Blend (Nutrition specialist)	PO Box 21	Oakey	Q4401
Illing	Tony	Selected Seeds (Branch Manager)	Grevillea Street	Pittsworth	Q4356
Jackson	Ken	UQ	University of Queensland	Lawes	Q4343
Jacob	Nick	Newcrest (Technical Specialist)	20 Terrace Rd	East Perth	WA6004
Jorgensen	Todd	Associated Grain (MD)	45 Condamine Street	Dalby	Q4405
Keating	Brian	CSIRO	306 Carmody Road	St Lucia	Q4067
Kidd	John & Gill	Grower	Green Hills	Meandarra	Q4422
Kubenk	David	Halliburton (Technical Advisor)	555 Coronation Drive	Toowong	Q4066
Langby	Brett	Farmer	Lodestone	Talwood	Q4496
Lawrence	Peter	DPI&F (Varietal Specialist)	DPI	Biloela	Q4715
Mailler	David	Farmer	Avondale Road	Boggabilla	NSW2409
Mailler	Peter	Farmer	Warrina	Surat	Q4417
Mailler	Michael	Farmer	Wonga South	Boggabilla	NSW2409
Michael	Mark	Ridley Agrifood Products (National)	Toowoomba	Toowoomba	Qld

		Business & Tech Manager)				
Moore	Richard	Woods & Woods (Technical Director)	52 Stuckey Close	Willow Vale	Q4209	
Muirhead	Grant	Chemiplas (Food Ingredients Business Manager)	Level 1/55 Parramatta Road	Lidscombe	NSW2141	
Murphy	Helen	UQ	University of Queensland	Lawes	Q4343	
Osmond	Steve	Riverina Stockfeeds (Procurement)				
Palmisano	David	Food Spectrum	53 Fairlaw Street	Nathan	Q4111	
Parkin	Ian	AGP	3 Rosemary Lane	Moggill	Q4070	
Proud	Cedric	Grower	Grantham Downs	Surat	Q4417	
Rollinson	Ian	Grower	Brynog	Surat	Q4417	
Skewes	Chris	Halliburton (Procurement)			WA	
Smith	David	Rhodia Inc (Business Development Manager Australasia)	42 Colebard St East	Brisbane	Q4108	
Singh	Danny	DPI&F (Animal Nutrition)		Brisbane	QLD	
Singh	Vinod	Rhodia Inc (Personal Care Products)	1333 The Horsley Drive	Wetherill Park	NSW2164	
Stevens	Rob	Grower	Bein Road	Blenheim	Q4344	
Stockton	Norm	Researcher	Kalgoorlie School of Mines		WA	
Thompson	Peter	Grower	Echo Hills	Wallumbilla	Q4428	
Ussher	Bryant	Grower	PO Box 331	Chinchilla	Q4413	
Overseas						
Ogier	Ian	Rhodia Inc (USA) (Global Purchasing, Guar)	259 Prospect plains Rd	Cranbury	New Jersey	
Sega	Carmine	Rhodia Inc (USA) (Business Director, Agrochemicals)	259 Prospect plains Rd	Cranbury	New Jersey	
Kotacska	Warren	Rhodia Inc (USA) (Ind & Oil Specialist)	259 Prospect plains Rd	Cranbury	New Jersey	
Ordanini	Luca	Lamberti s.p.a (Lamberti Group Purchasing Manager)	Via pave, 18	21041 albizzate	Italy	
Pfeiffer	Ugo	Lamberti s.p.a (Technology Manager, Natural polymers)	Via pave, 18	21041 albizzate	Italy	
Tenconi	Mauro	Lamberti s.p.a (R&D Manager Natural polymers)	Via pave, 18	21041 albizzate	Italy	
Rossi	Dario	Lamberti s.p.a. (Logistics Manager)	Via pave, 18	21041 albizzate	Italy	

Appendix 2 - Producer Questionnaire

Appendix 3 - Brochure

What is Guar?

Guar (*Cyamopsis tetragonoloba*) is a legume often referred to as a cluster bean. It is most commonly grown in India and Pakistan, where 90% of the world's production takes place. The tubers of Guar is ground to produce a powdered guar which is used in a variety of products.

History of Guar in Australia

Guar was first introduced into Australia in 1910 from India.

Little research was conducted on it as a potential crop until the 1970s and 1980s when QDPI and CSIRO conducted some trials using imported seed from India.

Research when it was undertaken focused on the agronomic characteristics of the crop and it's soil requirements.

The scientific information generated by the early work of Ken Jackson, John Dougherty and Bruce Topping has not been repeated and should be repeated for detailed agronomic information (the REDUC Project Report).

Is there a Market for Guar?

YES

- World consumption of Guar is increasing at an average rate of 2% per year.
- Guar is processed into a wide variety of products including:
 - Food thickeners (e natural food additive, commonly GM free)
 - Pre food
 - Concrete, damp-proof, latex gels and soaps
 - Textiles
 - Building materials
 - Mining products and Explosives
- Currently 1,500 tonnes/year of powdered guar gum is imported into Australia for use in:
 - Food industries
 - Mining industry
 - Personal care products
 - Industrial ingredients (agrochemicals, etc.)
- Companies importing, supplying or using Guar in Australia include:
 - > Rhodia Inc
 - > Chemplex
 - > Praxair/Phelps
 - > Kerry Food
 - > Pioneer & Gambale
 - > Woods & Woods
 - > Skollburns
 - > Diabaco
 - > Minterfinch
 - > Goodman Fielder

Guar is used in various industries, such as:



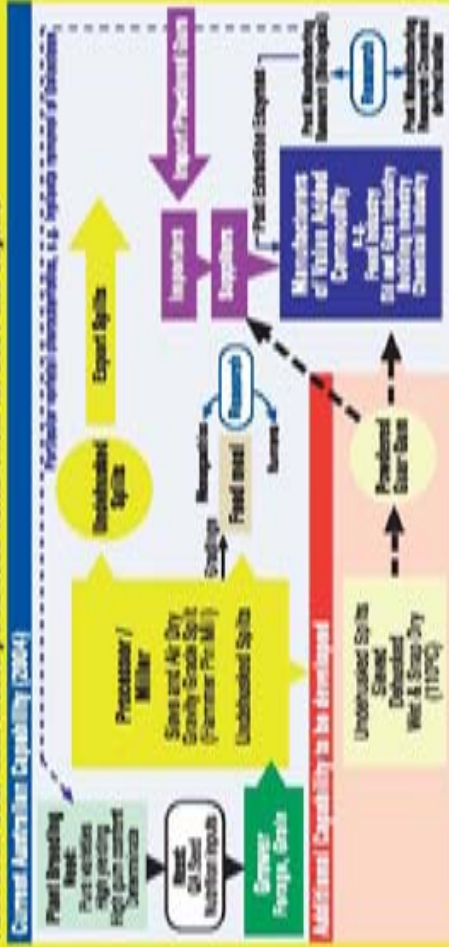
Is there an Agronomic Benefit?

YES

- Guar is an option for a summer legume crop in Northern New South Wales, Queensland and the Northern Territory
- Guar is a soil conditioner (if improved variety)
- Guar increases soil nitrogen (>70 kg/ha)
- Guar is a disease break (reduces common root rot)
- Guar is an excellent forage crop



Australian Guar Gum Industry Domestic Value Chain for 2004 and beyond



Challenges of Growing Guar in Australia

1. Poor agronomic information availability
Solutions > Guar Industry Development Association (GIDA) website developed and maintained with quality up-to-date information.
2. Multi-variety lines and indeterminate maturation
Solutions > Varietal plant breeding that addresses market needs of high yield and high gum content.
3. Dirty seed and poor germination
Solutions > Establish standards for clean, certified seed including collection and storage.
4. Inappropriate varieties and "dry" soils
Solutions > Better informed growers via DPI&F and GIDA websites.
 - Guar requires phosphorus, zinc and trace elements for successful growth.
 - Guar is very sensitive to waterlogging and compaction
 - Free draining, friable soils that have some water holding capacity give best results in growing dryland Guar. Irrigation on sandy soils gives optimum yields.

5. Weed problems

Solutions > Register appropriate herbicide.

BOTTOM LINE

Question: Can Australia grow enough Guar grain each year to provide a reliable supply to the market?

Answer: Only if the above issues are addressed.

Useful websites

PL Thomas Guar Updates: www.plthomas.com/news.htm
 South West Guar: www.swgat.com/
 AFDA (New Industries Development): www.nifia.gov.au
 QDPI&F: www.dpi.qld.gov.au/fieldcrops/18669.html
 Texas A&M University:
http://jimpeter.tamu.edu/agronomy/guar_production.htm

Market Challenges and Opportunities for Australian Guar

1. Lack of knowledge of potential markets, product pricing and specification requirements.
 - Develop, maintain, disseminate latest market information via the GIDA website.
2. Guar has a highly competitive and established market dominated by India which supplies most of the world.
 - Markets for Australian Guar will be difficult to establish.
3. Industries that use Guar gum prefer it to all other equivalent gums and need an assured supply of highly specified product.
 - Suppliers require proven consistency with strict QA standards and traceability.
4. All Guar gum used in Australia is currently imported.
 - A potential domestic market exists in the Mining, Personal Care and Industrial ingredient industries.
5. Currently the only market for Australian Guar is for grain spilla, controlled by one off-shore processor. **This is a high risk situation aimed at building an industry.**
 - A spinning capability with fibre development plans for Guar gum powder processing is being developed in Dalby, QLD.
 - Dialogue with alternate buyers of Australian Guar products needs to be established to minimise single buyer risk.
 - Guar meal is an excellent source of protein for processed stockfeed. A focus should be on developing this product and the domestic market associated with it.
6. The skill to process Guar grain to gum of required specifications for different market sectors, is not yet present in Australia.
 - Needs to be addressed if the industry is to meet market requirements, particularly in the high volume food ingredient industry.

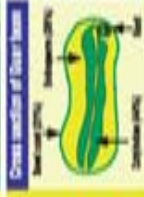
BOTTOM LINE

Question: Guar is a commodity—why should current suppliers buy Australian Guar?

Answer: The seasonal difference in availability compared to the northern hemisphere is a positive, BUT it will only happen if Australian Guar costs less, grows to be of consistent high quality and has a reliable, consistent, traceable, GM free supply.

IS GUAR A POTENTIAL INDUSTRY IN QUEENSLAND?

What – Why – How



For further information contact:

Kim Bryceson – The University of Queensland
 Telephone: (07) 5460 1617
 Email: k.bryceson@uq.edu.au

Richard Rowley – DPI&F, Roma, QM
 Telephone: (07) 4624 1711
 Email: Richard.Rowley@dpi.qld.gov.au
 Todd Jurgens – Associated Cereals, Dalby, QM
 Telephone: (07) 4662 1999
 Email: tdhoc.grain@agood.com

Partner:



These slides to assist in field/industry

Appendix 4 - Workshop Agenda, Speaker List and Outcomes

GUAR VALUE CHAIN WORKSHOP
July 14 2004

Guar Beans to Ice Cream

Date: Wednesday, 14th July, 2004
Venue: University of Queensland, Gatton Campus
Building 8117, Room No: 215

AGENDA

- 9.30am Arrival (Tea & Coffee)
- 10.00-10.15 Introduction — Richard Routley (DPI&F) & Todd Jorgensen (GIDA)
- 10.15-10.45 Report on RIRDC Project: *Value Chain & Market Analysis for the Australian Guar Industry* — Dr Kim Bryceson & Mrs Marg Cover
- 10.45-11.00 Morning Tea**
- 11.00-12.30 Cameo discussions (10mins each) with potential Guar Chain Members — Growers (Grain & Forage), Processor, Feed Manufacturer, Trader, Food Industry, Biopolymer Industry
- 12.30-1.30 BBQ Lunch**
- 1.30 -2.00 Associate Professor Ray Collins (New Industry Development Board, Supply Chain Initiative, DAFF)
- 2.00 -2.30 Qld State Development Representative
- 2.30—2.45 Afternoon Tea**
- Where to from here?**
- 2.45 -3.15 Successful New Industries — Supply Chain examples
Dr Lilly Lim (Centre for Native Floriculture)
- 3.15-4.15 General Discussion to develop a Guar Industry Development Action Plan (*What, Why, How and Whom*)
- 4.15-4.30 Final Round-up — Kim Bryceson, Richard Routley

RSVP: Friday 9th July, 2004

Kim Bryceson — k.bryceson@uq.edu.au.
Ph: 07 5460 1617

Richard Routley — Richard.Routley@dpi.qld.gov.au
Ph: 07 4624 1711

Speakers

Morning speakers were invited from all parts of the potential guar industry chain and were asked to focus on what role they saw for guar and why, and how they thought that their link in the chain might be involved in the industry's development.

Afternoon speakers were new industry development specialists.

Morning

Mr Richard Routley – Senior Developmental Agronomist, Queensland Dept of Primary Industries, Fisheries & Forestry, Roma, Qld.

Dr Kim Bryceson - Project Leader, University of Queensland, Gatton Campus, Gatton, Qld.

Mr Mike Mailler - Grower, Wonga South, Boggabilla, NSW.

Mr Graham Carrigan - Grower, Palm Grove, Moura, Qld.

Mr Todd Jorgensen - Managing Director, Associated Grain, Dalby, Qld.

Dr Brenton Hoskin - Nutritionist, Better Blend Stockfeed, 9 Queen St, Oakey, Qld.

Professor Mike Gidley - CRC Biopolymer (ex Unilever), University of Queensland / DPI&F, St Lucia Campus, Brisbane, Qld.

Afternoon

Associate Professor Ray Collins - New Industries Development Board, AFFA / University of Queensland, Gatton Campus, Gatton, Qld.

Dr Lilly Lim - Centre for Native Floriculture, University of Queensland, Gatton Campus, Gatton, Qld.

Mr John Hine - Project Manager, Industry Development Division, Qld State Development, Brisbane, Qld.

Outcomes of Workshop “What, Why, How and Whom” Session

What	Who	When	Outcome sought
Appoint Industry Development Officer	GIDA	By next season (2004/2005)	Identify growers/locations to grow guar/ Market Development. State Govt grant?
Improve the PR of guar	Industry Development Officer/GIDA	When IDO appointed	Improve growers perception of guar
Establish reliable supply of guar	GIDA	ASAP	Supply existing market
Research into Plant Varieties (incl Disease resistance)	New Research + Existing breeders & others	ASAP	Commercially viable varieties Good disease resistance
Varieties need to be evaluated for soil & climate	DPI&F(?), GIDA,	Next season	Growers have confidence that varieties suit local condition
Comparative variety trials	Seed producers/GIDA	Next season	Allow comparative evaluation of different varieties re soil, location
Improve seed quality	Seed producers/GIDA	By next season	Develop certification guidelines
Develop Information package	DPI&F, GIDA	By next season (2004/2005)	
Develop further processing capability	Associated Grain	ASAP	
What is the growth market	Kim Bryceson	End of July	10-15,000 tonnes grain/yr
What is the critical mass for growers?	Kim Bryceson	End of July	For minimum 5000 t/a, will need (@ 1t/ha) 50 growers (100ha each) *100 growers (50-100 ha each) * Best scenario
Equivalent cost of guar landed in Aus?	GIDA & Processors	End of July	
High viscosity product production	Research		
Key group of committed growers – identify & commit	DPI&F, GIDA	By next season (2004/2005)	Support growers to have successful guar crop
Explore formation of a company or JV to grow guar potential	Associated Grain, GIDA, Qld State Development	By next season (2004/2005)	Establish a legal entity to capture existing IP of current guar
Conversation with Pulse Australia to incorporate guar under their umbrella	Marg Cover	Mid August 2004	
Investigate price paid for whole grain	Associated Grain & buyers – eg Lamberti s.p.a.		‘Seconds’ price and premium for processing quality. Feedback loop.
Investigate price of whole grain guar (30% protein) in stock feed industry.	Associated Grain	ASAP	Base established in market for guar
Identify competitors to guar in stockfeed industry (eg soybean, cotton seed)	Associated Grain		
Ascertain MRL’s for weed control	David Mailler(John Slatter)		Quote for cost of registering chemicals eg
Identify ‘Neem effects’ of guar (what active ingredients do/don’t exist)	Research		
Accredited guar agronomy course	UQ/DPI&F/GIDA/Pulse Australia?	By next season	Consistent, credible information to growers

Suggestions re: Guar from Workshop

Name	Company	Today's Ideas	Skill & Capabilities	Suggestions
Don Beech	Breeder	Cause of Maillers disease by leaf hopper is a microplasma which affects a large number of plant species	Scientific knowledge	More attention to the milling process & chemistry of the meal Desk top study to map areas (soil & climate) suitable for guar in northern region (re Henry Nix research for sorghum)
Kim Bryceson	UQ	Workshop	Value Chain/Market Analysis and Information Technology	As per Report
Graham & Mary Carrigan	Farmer	QA important; Guaranteed certified seed important; clean seed important; clean headers and trucks at harvest to keep out all foreign material important.	Help new growers coming into the industry	Basic, easy to read leaflet outlining soil types, weed & insect problems, planting & harvesting. Advantages of haymaking from stubble & seed as cattle feed.
Marg Cover	Producer /Research Officer	Workshop	Agri-Networking, Information gathering & Administration	As per Report
Margaret Cruickshank	DPI&F	Willing to facilitate a strategic action planning process	Change design & implementation skills	
John Dingle	UQ Gatton	Designate a driver (eg GIDA) who does the communication & integration to market supply chain work	I can test the nutritional value of guar meal (by product) for poultry	Expand each stage & make it profitable e.g. make the split export the basis of expansion until the gum process commences & then work to make this profitable
John Doughton	DPI&F		RD&E experience with guar	Need QA/certified seed Need good agronomy info available. Website excellent idea
Douglas Fox	Farmer	Caution: evaluate global supply/demand Consider level playing field Production for local Australian market	Production	Licence to produce on and at a biologically environmentally suitable area for seed/gum
Mike Gidley	Researcher	Presentation on application & value adding opportunities	Polysaccharide biochemistry & relationship to application performance. R&D in support of industry development Viscosity tests for variety trialling	Keep the faith!!

John Hine	State Development	Need to be sure buyer for guar is in place. Have a commercial approach – form companies to drive	Identify international customers Investment facilitation International links Possible financial assistance with planning process	Be commercial & customer focussed not production driven Companies make things happen, not 'industries'
Ken Jackson		Determine market to aim for Many markets may assume we can deliver a QA'd product when we are still having trouble producing consistent yields. Maybe need to start producing stock feed, get confident growing crop & expand	Always willing to pass on any knowledge & experience as requested	Investigate minor use chemicals permit for use of herbicides. Review opportunities in stockfeed industry for guar meal in monogastrics eg Dr John Dingle -poultry
Gill Kidd	Farmer	Growing the crop from a farmer's perspective. How many growers would actually grow it. Is the total potential yield in an average year enough to sustain an Australian industry	Interest in growing a crop for: -grain -as a green manure crop -trialling new varieties in different soils	Do growing condition effect viscosity? Does Lamberti have records of the viscosity of our guar? Would like to see NIDP fund development officer
David Mailler	Farmer/seed producer		R&D Cooperator, Grower advocate for guar, will attend meeting to progress guar, continue to develop agronomic ideas	Agronomic facts for growing guar need to be adequate to create viable yield Yield beats price
Michael Mailler	Farmer/seed producer	Improve agronomic info flow, widen production area-increase tonnage & reliability-more effective processing. Appoint IDO	Trial work, seed production, line reselection, agronomic info	Need reliable supply of good quality seed through eg Associated Grain. Need for weed control options. Need R&D on diseases
Helen Murphy	Researcher		Research in growing guar esp effect of leaf canopy, planting arrangements, cultivar type influence gum yield. Chemical analysis of guar gum	Increase amount of grain produced – sufficient amount for processors. More markets needed- investigate stockfeed market
Ian Parkin	AGP	Suitable seed varieties are essential	Seeds selling, contract arrangement, agronomic advice. AGP has a long list of potential guar growers	Employing one full time Guar Development Officer would be prohibitive
Richard Routley	DPI&F	Workshop	Senior Development Agronomist	As per Report

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Useful WebSites

Chemiplas	www.chemiplas.co.nz
Danisco	www.danisco.com
Halliburton	www.halliburton.com
Lamberti s.p.a.	www.lamberti.com
NCDEX	www.ncdex.com (National Commodity & Derivatives Exchange)
Rhodia Inc	www.rhodia-hpcii.com/hpcii/product_finder.jsp
Shree Ram Gum	www.shreeramgum.com
Texas A&M University	http://juniper.tamu.edu/agronomy/guar_production.htm
South West Guar	www.swguar.com
PL Thomas Guar Updates	www.plthomas.com.news.htm