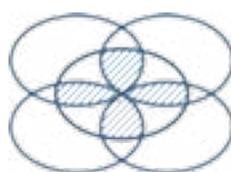


# Guar Production under Spate Irrigation Systems

# 19



Practical Note Spate Irrigation



Spate Irrigation  
Network



Provinces	Districts/ Regions
Punjab	D.G. Khan, Rajanpur, Chakwal, Bhakar, Leyah, Bahawalpur
Kyber Pakhtunkhwa (KPK)	D.I. Khan, Tank, Luki Mawrat
Balochistan	Sibi, Bolan, Kachi, Jhal Magsi, Kharan, Lasbela, Khuzdar
Sind	Tharparkar, Jamshoro, Sanghar, Khairpur, Dadu, Parts of Karachi and along the Kirther range

Table 1: Districts/ Regions in Pakistan where guar is cultivated

### Introduction

Guar or cluster bean (*Cyanosis tetragonoloba*) is a legume that is grown in the hot and arid regions of the four provinces of Pakistan. Table 1 shows the regions in Pakistan where it is grown. Sandy soils are most appropriate for this crop. The Thal desert, parts of Cholistan desert in Punjab, the Thar deserts in Sindh province and the sandy belts of the Balochistan lowlands are the best regions for its cultivation.

Guar is predominantly an arid zone crop. it can sustain low moisture content. Extra moisture

through irrigation will produce a crop with more leaves and less seeds. In spate irrigated areas, guar is sown when the moisture of the field and the magnitude of the spate flow are insufficient to support major crops like sorghum and wheat. In spate irrigation areas they consider guar a 'non thirsty crop'.

Because guar is a legume, it is able to fix nitrogen. Therefore it is excellent for the use of crop rotation. Its biomass improves the soil quality. Experiments shows that wheat cultivated after guar produced 5 to 10 percent more yield.

Guar is a special crop with multiple purposes. On international level, the gum is commercially used in industrial products ranging from confectionary items to gunpowder and textile dyeing. Guar is also popular in foods as it is a no calorie binding agent.

In Pakistan, the immature pods of cluster beans are locally cooked as vegetables, being a main source of minerals and fibres for people in arid areas. The valuable threshing straws (chuff) are an important feed for animals like goats, sheep, cattle and camels. This is sold for high prices as it can be kept longer than straws of other plants. Furthermore farmers prefer the chuff from guar over other crop straws/stalks due to its palatability to feed their animal



Figure 1: Guar field on sandy soil, Pakistan.

Farming practices	Specifications
Seeding	<ul style="list-style-type: none"> <li>• Seedbed: firm, weed-free</li> <li>• Date: soil temperature &gt; 21 °C (optimum: 30 °C); monsoon-regions: after first rain event in June or early July</li> <li>• Rate: seed use: 10–30 kg/ha, biomass use: 50–100 kg/ha</li> <li>• Row spacing: seed use: 45–60 cm, biomass use: 30–45 cm</li> </ul>
Fertilizer	<ul style="list-style-type: none"> <li>• Nitrogen: not necessary</li> <li>• Phosphorus: often limiting, USA: Superphosphate 200–250 kg/ha</li> </ul>
Plant Protection	<ul style="list-style-type: none"> <li>• Weeding: young guar plants development is very susceptible to weed concurrence; well and early prepared seedbeds help to reduce weed pressure</li> <li>• Diseases: choose disease-resistant cultivars, 2 major diseases: <i>Alternaria cucumerina</i> var. <i>cyamopsidis</i> and <i>Xanthomonas cyamopsidis</i></li> <li>• Predators: <i>Contarinia texana</i> guar midge: rainfall or sprinkler irrigation reduce midge populations</li> </ul>
Harvest	<ul style="list-style-type: none"> <li>• Seed pods: dry, brown, 60–90 days after sowing; biomass: first lower pods turn brown</li> </ul>
Yield	<ul style="list-style-type: none"> <li>• Seeds: 5-8 dt/ha; biomass: 40-50 t/ha</li> </ul>

Table 2: Farming practices for guar specified (source: Wikipedia 2014)

### Cropping season and cultivation

For the rain-fed and spate irrigated areas, guar planting takes place immediately after the monsoon rains in June-Mid August. In the full irrigated areas, planting can already take place in March through May. However in these areas, it is mainly cultivated for green manure and animal fodder purposes. Warm and dry weather with temperatures of 77 – 90 Fahrenheit (25-32 degrees) is optimal for its germination.

Farmers mainly use the seeds that they have stored from previous year’s harvest. Sometimes they purchase seeds on local markets. Sowing with the use of seed drill or broadcasting are the most common planting methods for guar. Seed drilling is mostly done with tractors. In more moisture rich fields, guar is intercropped with crops such sorghum or millet. A seed rate of 25kg/ha is used under rain-fed conditions.

Table 2 gives a general summary of the farming practices for guar. However these farming practices can differ per location.

Chemical fertilizers are not used in rain-fed and spate irrigated areas. Only in full irrigated areas, phosphate and potash fertilizers are used for better seed production.

### Harvesting and threshing.

Guar is harvested in mid November. In general, it takes 90 days before guar can be harvested. However ripening and maturity of the plant is not uniform. The moisture content of mature pods need to be below 14 percent before it can be harvested. Some plants ripens earlier than others and thus harvested accordingly. The yield under rain-fed and spate irrigated conditions is 200-400 kg per acre.

Harvesting is preferred in the morning to avoid seed shedding. In sandy soil areas, guar is pulled. In full irrigated areas or areas with a hard soil, guar is harvested with a local made sickle.

The harvested plants are dried one to two weeks before threshing. In the past, Guar was threshed with the use of bullocks. This was a difficult

process because dried guar stems caused injuries on animals' feet. Now bullocks are replaced by tractors driven thresher machines.

Farmers who rent their tractor, charge 1/16<sup>th</sup> of the harvest. This charge contains both grains and chuff. In D.G. Khan and Rajanpur district, guar chuff is sold on the basis of approx. 100 kg filled bags.

### Storage and marketing

Farmers store an estimated amount of seeds to use in the next year planting. Seed is stored safely to avoid damage by moisture or insects.

Guar chuff, pods and beans are sold on the market in the first week of December. They are sold to local traders. Most of the time, chuff remains available on local market during the whole winter season. For the guar pods and beans, usually part of the payment is done when the traders have received the pods and/or the beans. The rest is paid when the it is sold on the urban market. However in the past, storage bags and some advance payment was provided by urban traders to the farmers in order to guarantee purchase. This practice is now on decline.

Normally local traders buy guar in large quantities and then sell it to traders in cities such as Karachi. Some farmers and local traders store guar to wait for better market prices . For instance, in 2011-2012, historical high market prices were reached.100 kg of guar bean was sold for Rs. 35,000 – 40,000 (245 – 280 euros). However every year the price for Guar fluctuates, due to imbalance in demand and supply. For instance in 2013, one bag was sold for the price of Rs. 1000-1600 (7-11 euro's).

Guar have a hard shell and long shelf life. It can be stored for years. Stored seeds can only rot due to high level of moisture or can be damaged by rodents. In many cases, the local traders profit from this crop when they keep it in storage. On the other hand, most farmers sell their crop immediately after harvest to earn cash.

The national production of 2013 was estimated on two million bags (100 kg each). However in January 2014, half of the production reached the Karachi market and half was still left in the storage of local traders. Furthermore in 2014 there were still 300,000 bags left on the Karachi market from last year.



Figure 2: Guar crop before threshing, Pakistan

### Local use of Guar and its products

The green pods of guar are locally consumed and cooked as vegetables. The guar chuff is often purchased by nomadic pastoralists. Every year seasonal migrants and nomadic pastoralists from Balochistan and the Afghan Highlands come with their flock to spend the winter in the spate irrigated areas of the Suleman foothills and Sibi plains. They buy Guar chuff to feed their small ruminants. Camel herders use large quantities of chuff during off season when green fodder is less. The guar beans are used as fodder for lactating cattle.

### Commercial use of Guar

Guar is used with enormous amounts. At local, national and international level. For subsistence to commercial purposes. Although it is used at household level as a vegetable or on national level for animal and poultry feed, approximately 90 percent of the guar is exported overseas, mainly to the USA.

It is mostly exported in its grinded form. Guar seeds are de-husked, milled and screened to get guar gum. Guar gum is an excellent emulsifier and tickets with good preservative characteristics and it used in commercial food processing. Its

thickening power is 8 times higher than corn starch. Its commercial uses are vast. Its gum is used in confectionary items, make up products, food preservation, ice cream, gun powder, printing devices (both paper and textile printing) and most important in fracturing process of oil and gas exploration and extraction. Prices of guar gum are high on the international market. In Australia 1 ton of guar gum cost 3250 Australian dollars.

### Recommendations

More research is required to introduce better varieties suitable for different ecological conditions. Furthermore improved and high yield varieties need to be introduced from other areas. At present, weeds are a serious problem that causes low guar yields. Measures have to be taken address this weed problem. There is a need to establish farmers' cooperatives. On this way farmers can store Guar beans properly and get better prices for their production on the local market.

On national level, processing and manufacturing facilities for gum extraction can help in the production of Pakistan labeled guar gum. This can be sold on the international market.



Figure 3. Guar growing in spate irrigation area - Dadu District, Sindh, Pakistan



Figure 4. Guar-millet mix farming, DG Khan spate, Pakistan

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**Colofon**

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The Pakistan Spate Irrigation Network supports and promotes appropriate programmes and policies in spate irrigation, exchanges information on the improvement of livelihoods through a range of interventions, assists in educational development and supports in the implementation and start-up of projects in Spate irrigation. For more information: [www.spate-irrigation.org](http://www.spate-irrigation.org).

