# Performance of guar as a new crop under flood irrigation in Gash Delta

Mohammed ELNaseeh M. Osman[1]

## Abstract

Guar was introduced in the Gash Delta for evaluation under the flood irrigation system as a new cash crop and/or fodder legume, but non-competitive with the main crops. As a drought tolerant crop, it was suggested to be planted in poorly-flooded areas or in the peripheries of the basins (misgas). The only variety available "Texcel" was planted in an intra–row spacing experiment for three seasons. Seed yield of guar was evaluated from broadcasting along 80 cm furrows or from 20 and 40 cm intra-row spacings. Differences in seed yields were not significant. The spacing 20x80 cm produced the highest seed yield of 1806 kg/ha, which was only 4% more than broadcasting. Although the widely spaced plants at 40 cm produced the highest number of pods/plant, yield did not increase due to low number of plants/unit area. Yields recorded at the Gash Delta were more than twice as much as the rainfed guar at Samsam Scheme, and similar to the irrigated guar in the Gezira. Guar is recommended as a new crop in the Gash Delta in the less-flooded areas or in the peripheries of the basins where other crops may not succeed.

## Introduction

Guar or cluster bean (*Cyamopsis tetragonoloba* L. Taub.) belongs to the family Leguminaceae and is grown in tropical Africa and Asia. Young pods are eaten as a vegetable, and seeds as cattle feed in India and Pakistan where the crop is also used as fodder and green manure. The seed flour is exceptionally viscous possessing 5 -8 times the thickening power of starch. It is used in paper industry, postage, stamps, textile, food products, e.g. bakery (Purseglove, 1982). and recently in petroleum oil industry. It is grown for gum production in India and United States. The crop is hardy, very drought tolerant and grows well in alluvial, sandy loams and well-drained soils.

The other member of the same genus (*C. senegalensis*) is believed to have been found wild in the Gash and Tokar deltas (Burhan, 1998). Guar is a new crop in Sudan, and is grown commercially in limited scale near Singa, Blue Nile, for seed processing into flour. Guar has a good potential as an export crop, besides being a good fodder crop.

Being drought tolerant, it is expected to fit very well in the Gash Delta as an important cash and fodder crop, but non-competitive with the main food and cash crops. There are always marginally irrigated areas in the delta due to uneven spreading and distribution of flood water, irregular flushes of the Gash river or due to breaching in the dykes and canals. Crops like the late maturing Aklamoi sorghum, cotton, sunflower or groundnuts will not succeed in such locations. Guar is expected to give an economical output in such marginally irrigated areas. In season 1982-83 guar was tried in the Gash Delta and recorded a yield of 623 kg/feddan ( Ali, 1990 ).

## Materials and methods

Seeds of one variety "Texcel" were provided by the Seed Propagation Station in Sinnar. The experiment started in season 1990-91 to determine the appropriate

[1]Agricultural Research Corporation, Shambat Research Station

plant density for seed production in the Gash Delta. Seeds were either hand-broadcasted along furrows 80 cm apart, or planted along 80-cm furrows at an intra-row spacings of 20 or 40 cm at the rate of 5-6 seeds/hole, later thinned to 3-4 seedlings/hole. The three treatments were arranged in a RCB design with 4 replications. The experiment was carried out executed in 4 different locations with different irrigation levels during the seasons 1990-91, 1992-93 and 1993-94. In season 1992-93 the experiment was conducted in 2 locations, location A (LA) was flooded for 10 days, and location B (L B) for 20 days. The pods were harvested when the plants were completely dry by threshing and winnowing to get the clean seeds.

## Results

### Seed yield

Differences in seed yield resultly from spacing were not significant in any of the four locations during the three seasons. However, the plant spacing 20x80 cm consistently produced the highest seed yield in the three seasons. It was 4% higher than either the yield from broadcasting or from the wider spacing of 40x80 cm ( Table 1). The overall mean yields in the three seasons were similar, viz 1700, 1659 and 1676 kg/ha, except in location B in season 1992-93 when the experiment was replicated in a well flooded location producing an overall mean yield of 2017 kg/ha. However, the grand mean of the four locations in three seasons was 1758 kg/ha.

### Pods/plant

The number of pods/plant was recorded in the last two seasons. The highest number of pods/plant was recorded at the wider spacing of 40x80 cm, while the lowest number was produced at the highest plant density of broadcasting (Table 2). Although plants in wider spacing produced more pods than closer spacing, the seed yield in closer spacings was higher due to the difference in the number of plants/$m^2$.

### Plant height

The mean plant height of the two seasons 1992-93 and 1993-94 was not significantly affected by spacing. The range of plant height in season 1992-93 was 121–131 cm, while in 1993-94 was 95-104 cm (Table 3).

## Discussion

Guar as a new crop in the Gash Delta showed high adaptability to the flood irrigation system. Seedling emergence was completed in 48–72 hours after planting whether sown in holes or broadcasted at different irrigation levels of 10–20 flood days. The overall mean of the seed yield across the three seasons was 1700 kg/ha. This was 2-3 times the yield of rainfed guar reported by Musa (1993) in Samsam and Moir (1965) in Abu Naama. Similar high yields of guar were only reported when the crop was regularly irrigated in the Gezira, or in Hudeiba, (Akasha, 1967; Daffalla, 1968 ).

Planting guar in the Gash Delta at different plant spacings of 80x20, 80x40 cm or broadcasting did not affect the seed yield significantly. Although the number of pods/plant greatly increased by the wider spacing of 80x40 cm, the seed yield at 80x20 cm was 4% higher than the wider spacing or broadcasting. Musa (1993) found the highest seed yield of rain-grown guar at the closest spacing of 10x60 cm in Samsam. Since close spacing or broadcasting along furrows produced similar yields,

it is easier and more practical and economic to use broadcasting rather than seeding in holes.

In season 1993-94 soil moisture stress in the experimental plot was caused by compacted clay loam soil at the end of the basin. Moisture depth was 120 cm but under laid by a sandy subsoil. Under such conditions Aklamoi sorghum produced only 60% grain yield compared to the previous season, while pegging in groundnuts was very limited due to desiccation of the carpophores, and maize dried prematurely producing low yields of 118–517 kg/feddan. In contrast, guar vegetative growth was normal without any symptoms of stress, and produced good seed yield of 1644- 1696 kg/ha.

## Recommendation

Guar may fit well in the Gash Delta as a non-competitive fodder/cash crop. It is recommended to broodeast the seeds along furrows 80 cm apart, in areas of limited flood irrigation or at the peripheries of the basins.

## References


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**Table 1. Effect of intra-row spacing on guar seed yield in three seasons (1990-91, 1992-93 and 1993-94)**

| Spacing (cm) | Seed yield (kg/ha) | | | | Mean (kg/ha) | % change |
|---|---|---|---|---|---|---|
| | 1990-91 | 1992-93 LA | 1992-93 LB | 1993-94 | | |
| Broadcast x80 | 1666 | 1600 | 2030 | 1644 | 1735 | |
| 20x80 | 1752 | 1678 | 2108 | 1686 | 1806 | +4 |
| 40x80 | 1683 | 1639 | 1913 | 1696 | 1733 | |
| S.E. (±) | 85 | 104 | 188 | 142 | 55 | |
| Mean | 1700 | 1639 | 2017 | 1676 | 1758 | |

**Table 2. Effect of intra-row spacing on number of pods/plant of guar in two seasons (1992-93 and 1993-94)**

| Spacing (cm) | No. of pods/plant | | Mean | Estimated (plants/$m^2$) |
|---|---|---|---|---|
| | 1992-93 | 1993-94 | | |
| Broad cast x 80 | 104 | 99 | 102 | 40 |
| 20x80 | 116 | 140 | 128 | 30 |
| 40x80 | 138 | 134 | 136 | 15 |
| S.E (±) | 15 | 28 | 22 | 5 |

**Table 3. Effect of intra–row spacing on plant height of guar in two seasons (1992-93 and 1993-94)**

| Spacing (cm) | Plant height (cm) | | Mean (cm) |
|---|---|---|---|
| | 1992-93 | 1993-94 | |
| Broad cast x 80 | 129 | 95 | 112 |
| 20x80 | 131 | 103 | 117 |
| 40x80 | 121 | 103 | 112 |
| S.E ± | 0.9 | 5.1 | 2.5 |