



# Asian Journal of Plant Sciences

ISSN 1682-3974

**science**  
alert

**ANSI***net*  
an open access publisher  
<http://ansinet.com>

## BR-99 A New Guar Cultivar Released for General Cultivation in Punjab Province

Muhammad Iqbal Saleem, <sup>1</sup>Syed Arif Hussain Shah, Lal Hussain Akhtar  
Agricultural Research Station, Bahawalpur, Pakistan

<sup>1</sup>Regional Agricultural Research Institute, Bahawalpur, Pakistan

**Abstract:** The new variety BR-99 was developed through single plant selection. A promising line was selected from the local material during 1990 and was given the No 786. Replicated progeny row trial was conducted during 1991-92. The station yield trials of this variety spanned from 1992-93 to 1994-95. Zonal varietal trials were conducted from 1995 to 1998 at 8 different locations in comparison with checks (BR-90 and 2/1). On the basis of average of 33 yield trials, BR-99 gave 23.0 and 36.7% higher yield than BR-90 and 2/1, respectively. It best sowing time is the second fortnight of month of June. It gives best yield when NPK @ 20:80:0 kg ha<sup>-1</sup> area applied at the time of seedbed preparation. It is tolerant to insect pests and diseases and requires minimum plant protection. Its yield potential is 1800-2420 kg ha<sup>-1</sup>. It is early maturing with 1000-grain weight of 35 grams and 4.8-12.1% higher protein contents than checks. It was released for general cultivation in the irrigated and non irrigated areas of the Punjab province especially Thal and Bahawalpur areas.

**Key words:** Guar (*Cyamopsis tetragonoloba*), cultivar, yield

### Introduction

Guar (*Cyamopsis tetragonoloba* L. Taub.) belongs to family Leguminosae (2n = 14). Whistler and Hymowitz (1979) have listed 122 common names for guar given in various languages. It is also known as cluster bean and is a coarse summer annual legume. Guar has remained a minor crop until the recent past. Now it seems destined to assume a large role among the domesticated plants that supply the food and needs of human beings. It is well adapted to semi-arid and arid regions of Pakistan but 80% of the crop is grown under irrigation. Soils with pH of 7.0 are better suited for guar production. It is also tolerant to salinity. It is grown for fodder, cover and manure crop, and seed production. Its immature pods are used as vegetable. Guar seed contains 27-37.2% protein of nutritional quality. Whistler and Hymowitz (1979) have reported about 18 amino acids in guar protein. Four different fatty acids have been reported in guar seed (Van Etti et al., 1961). These investigators believe that guar seed oil (4%) can be used as food. Guar seeds and leaves are used to cure night blindness, smallpox, plague, enlarged livers, head swellings and swellings due to broken bones. Ground seeds of guar contain about 5, 31.8, 4.6, 6.8 and 5.7% protein gum, fat, methionine and ash, respectively (Bhatti and Sial, 1971). Hussain and Ullah (1963) have reported that guar meal could be a better replacement of cotton seed cake as poultry and cattle feed. Whistler and Hymowitz (1979) indicated that guar seed endosperm is a source of useful industrial gum. This discovery has brought this minor crop known to world recognition and introduced it as a major/commercial crop. Guar seed contains 35-42% gum. This gum is used in paper industry, cosmetics, pharmaceutical, oil well drilling, explosives, ice cream processed cheese products, baked goods, pastry icings, as meat binder, canned meat products, dressings and sauces, beverages, mining industry and tobacco. Due to its superior gum qualities, there is a great demand of guar seed in advance industrial countries like USA, Britain and Italy etc. India, Pakistan and USA are the major guar producing countries while India and Pakistan are the major exporters of guar to USA. Pakistan is exporting guar and its products to about thirty different countries of the world and earned about 32.3 million dollars as foreign exchange during 1996-1997 (Anonymous, 1997).

Yields of guar fluctuate widely from year to year depending upon the rainfall. Punjab produced 78.4% (105.6 thousand tones) of the total production of Pakistan (134.7 thousand tones) from an area of 105.0 thousand hectares during 1998-99. Average yield of guar in Punjab (1006 kg ha<sup>-1</sup>) (Anonymous, 1999). During 1999-2000, it was grown on an area of 109.3 thousand hectares with a production of 105.9 thousand tones of seed in Punjab (Anonymous, 2000a).

Keeping in view the increasing importance of guar crop, the present studies were conducted to evolve high yielding guar varieties. Resultantly the new variety BR-99 was developed during 1999. The newly developed variety BR-99 is high yielding than the existing varieties (BR-90 and 2/1) and has also a wider range of adaptability.

### Materials and Methods

The variety BR-99 was developed through single plant selection. A promising line was selected from the local material during 1990 on the basis of better

plant type, pods formation, grain size and tolerance to insect pests and diseases and was given the No. 786. Replicated progeny row trial was conducted during 1991-92. The station yield trials of this variety were conducted at Agricultural Research Station, Bahawalpur, during 1992-93 to 1994-95. Zonal varietal trials were conducted from 1995- to 1998 at 8 locations in Bahawalpur, Faisalabad and Dera Ghazi Khan divisions in comparison with checks (BR-90 and 2/1). Its package of production technology was also ascertained. The Regional Agricultural Research Institute, Bahawalpur conducted the entomological and pathological studies during 1995-98. All the yield and production technology trials were laid out according to Randomized Complete Block Design and plot size of 16m<sup>2</sup>. Chemical analysis was got done from the Cereal Technology Laboratory at Wheat Research Institute, Faisalabad. Four samples per variety were analyzed for protein analysis. In all yield trials, the data on grain yield (kg ha<sup>-1</sup>) were collected and subjected to analysis of variance. The means were compared by Duncans Multiple Range Test (Steel and Torrie, 1980).

### Results and Discussions

**Yield performance:** On the basis of average of three station yield trials, BR-99 performed better (1957 kg ha<sup>-1</sup>) than both the checks by giving 24.6 and 88.7% higher yield compared to BR-90 (1323 kg ha<sup>-1</sup>) and 2/1 (1037 kg ha<sup>-1</sup>), respectively (Table 1). The variety BR-99 significantly out yielded the check varieties i.e. BR-90 and 2/1 at all the 10 test sites in Zonal Varietal Trials. On an average, it gave 16.24 and 27.5% higher grain yield than BR-90 and 2/1, respectively, during 1995-98 (Table 2).

**Production technology:** The results of production technology trials of the new variety BR-99 are give in Table 3. This package was ascertained by conducting the following experiments:

**Sowing date trials:** Maximum grain yield of 1860 kg ha<sup>-1</sup> was obtained when the crop was sown on June 15th on the basis of three years average (Table 3). Therefore, sowing of the variety BR-99 in the 2nd fortnight of June is recommended for better grain yields.

**Seed rate trials:** The results of seed rate trials conducted during the year 1996-98 on BR-99 (Table 3) illustrated that maximum grain yield of 1720 kg ha<sup>-1</sup> was obtained by the use of 30 kg seed ha<sup>-1</sup>. Hence 30 kg seed ha<sup>-1</sup> is appropriate to have better grain yield.

**Fertilizer trials:** Response of the variety BR-99 was studied at five NPK levels during 1996-98. The results revealed that the variety BR-99 had a relatively higher phosphorus requirement (Table 3). It gave maximum grain yield of 1440 kg ha<sup>-1</sup> at 20:80:0 kg ha<sup>-1</sup> NPK at seedbed preparation.

**Irrigation trials:** The variety BR-99 was grown under five irrigation levels. The results indicated that the variety produced maximum grain yield of 1806 kg ha<sup>-1</sup> with four irrigations i.e. 1st irrigation at 30 days of sowing, 2nd at flowering, 3rd at pod formation and 4th after 90 days of sowing, 2nd at

Table 1: Performance of BR-99 in station yield trials

Name of trials	Years	Grain yield (kg ha <sup>-1</sup> )			% increase over checks	
		BR-99	BR-90	2/1	BR-99	2/1
A1	1992-93	1870	1350	1030	27.8	45.0
B2	1993-94	1580	1050	950	2.8	13.7
C1	1994-95	2420	1570	1130	54.1	114.2
Average		1957	1323	1037		
% increase over checks			24.6	88.7	Cd1 = 88.89	

Table 2: Performance of BR-99 in zonal varietal trial

Locations	Grain yield (kg ha <sup>-1</sup> )		
	BR-99	BR-90	2/1
Agricultural Research Station, Bahawalpur	2032	1680	1542
Uch Sharif (Ahmadpur east)	1902	1665	1490
Agricultural Research Station, Khanpur	1867	1610	1605
Adaptive Research Farm, Rahimyar Khan	1827	1698	1364
76-4/R, Haroonabd	1853	1558	1417
181-Murad, Hasilpur	1814	1521	1362
Shabirabad, Jhang	1895	1583	1447
Adaptive Research Farm, Karor	1935	1665	1482
Arid Zone Research, Head Raj Kan	1780	1590	1488
Mauza Ahmaddin, Dera Ghazi Khan	1919	1623	1565
Average of 10 location	1882	1619	1476
%age increase over checks		16.24	27.50
Cd1 = 74.69	Cd2 = 102.34		

Table 3: Summary of production technology trial of variety BR-99

Name of trials	No. of treatment	Best treatment	Years			
			1996-97	1997-98	1998-99	Average
Sowing data	6 (May 1st to July 15th with 15 days interval)	June 15th	1850	1867	1863	1860
Seed rate	8 (10, 15, 20, 25, 30, 35, 40 and 45 kg ha <sup>-1</sup> )	30 kg ha <sup>-1</sup>	1696	1707	1757	1720
Fertilizer	6 (0:0:0, 20:0:0, 20:40:0, 20:40:20, 20:80:0 and 40:80:40)	20:80:0 kg ha <sup>-1</sup> NPK	1336	1629	1356	1440
Irrigation	5	4 Irrigation	1850	1640	1930	1806
Spacing (Row to Row)	4 (15, 30, 45 and 60 cm)	30cm	1868	1609	1790	1756

Table 4: Insect pests and disease reaction of BR-99

Varieties	<sup>1</sup> No./Leaf		
	Jassid	White fly	<sup>2</sup> Root rot %
BR-99	0.50	1.25	1.09
BR-90	1.25	5.75	13.33
2/1	1.50	6.30	20.00

Sources: <sup>1</sup> Entomologist, Regional Agricultural Research Institute, Bahawalpur  
<sup>2</sup> Plant Pathology, Regional Agricultural Research Institute, Bahawalpur

Table 5: Varietal characteristic of BR-99

Characteristics	Value
Days to Maturity	110-120 days
Plant height at maturity	110 cm
Growth habit (at seeding and booting stage)	Erect
Pod color at maturity	White
Pod shape	Tapering
Pod size	Medium
Seed shape	Round
Seed size	Medium
Seed color	Grey
1000-grain weight	37 gms
Protein contents	34.84%
Resistance to insect pests	Tolerant
Resistance to root rot	Tolerant
Yield potential	1800-2420

Table 6: Protein contents of different guar cultivars

Varieties	Protein(%)	% increase over checks
BR-90	33.5(%)	4.8
2/1	28.90	12.1
BR-99	34.84	

Source: Wheat Research Institute, Faisalabad

flowering, 3rd at pod formation and 4th after 90 days of sowing (Table 3). Matlock and Aepli (1948) reported similar results.

**Spacing trials:** The trials on the effects of row spacing on the grain yield of BR-99 revealed that 30 cm row to row spacing was the most appropriate to get better grain yield (Table 3). Plant to plant distance of 10-15 cm is recommended. Insect pests and disease reaction: Guar crop normally remains free from major insect pests. However, few insects like cotton jassid (*Empoasca devastans* Dist.) and whitefly attack this crop. Cotton jassid prefers guar to cotton (Abbas and Afzal, 1946). BR-99 was found to be tolerant to jassid and whitefly with a relatively low infestation compared to the checks. The variety BR-99 was also found tolerant to root rot disease (Table 4).

**Varietal characteristics:** Varietal characters of BR-99 were recorded and are presented in Table 5.

**Quality studies:** It is clear from the data presented in Table 6 that BR-99 contains 34.84% protein as against 33.25 and 29.90% protein of the check

varieties BR-90 and 2/1. It has 4.8 and 12.1% higher protein contents compared to BR-90 and 2/1, respectively. The variety BR-99 is a cluster type early maturing variety. It has 1000-grain weight of 37 gms and 4.8-12.1% higher protein contents than the checks. It is tolerant to insect pests and diseases and requires minimum plant protection. It vacates the fields well in time and facilitates timely sowing of wheat against cotton. It is hoped that this variety will be helpful in boosting up the guar production/yields in the region. On the basis of its better yield performance and quality than the existing approved varieties of guar (BR-90 and 2/1), it was approved by the Punjab Seed Council, Lahore during the year 2000.

## References

- Abbasi, M. and M. Afzal, 1946. Cotton jassid (*Empoasca devastans* Dist.) In the Punjab VI. Species found on the cotton plant in the Punjab. *Indian J. Agric. Sci.*, 15: 119-24.
- Anonymous, 1997. Pakistan exports of principal commodities (1996-97). Export promotion Bureau of Pakistan, Karachi, Pakistan.
- Anonymous, 1999. Agricultural Statistics of Pakistan, 1998-1999. Ministry of Food Agriculture and Livestock (Economic Wing), Government of Pakistan, Islamabad, pp: 42-43.
- Anonymous, 2000a. Final estimates of guar seed crop in the Punjab for the year 1999-2000. Crop Reporting Service, Lahore, Pakistan
- Anonymous, 2000b. Minutes of 24th meeting of the Punjab seed council held on 12.09.2000. Circulated vide PSC letter No. PSC/HQ/-COORD/19/2000/2245-64 dated Lahore, the 28th September, 2000, pp: 7-8.
- Bhatti, M. B. and M.B. Sial, 1971. Guar: Its utility in food and nonfood industries. *Pak. J. Sci. Res.*, 23: 1-5.
- Hussain, A. and M. Ullah, 1963. Guar grain as substitute for cotton seed cake for milch cattle. *West Pak. J. Agric. Res.*, 1: 12-17.
- Matlock, R. L. and D.C. Aepli, 1948. Growth and diseases of guar. I. Growing guar in Arizona. *Ariz. Agric. Exp. Station, Bull.*, 216.
- Steel, R. G. D. and J. H. Torrie, 1980. Principles and Procedures of Statistics. McGraw Hill Book company, New York, pp: 187-188.
- Van Etten, C.H., R.W. Miller, I.A. Wolf and Q. Jones, 1961. Amino acid composition of twenty-seven selected seed meals. *J. Agric. Food Chem.*, 9: 79-82.
- Whistler, R. L. and T. Hymowitz, 1979. History: Traditional uses of guar. In: R. L. Whistler and T. Hymowitz ed.: Guar: Agronomy, Production, Industrial use, and Nutrition. Purdue University Press, West Lafayette, Indiana, pp: 1-15.