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# RESPONSE OF NEW GUAR STRAINS TO VARIOUS ROW SPACINGS

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A field experiment was conducted to ascertain the response of three guar strains namely BR-99, S-4002 and BR-99 Super grown at different row spacings of 30, 45 and 60 cm during 2010 and 2011. The experiment was laid out in Split Plot Design with three replications. The data on plant height, number of branches per plant, number of pods per plant, pod length, number of grains per pod, 1000-grain weight and grain yield ha$^{-1}$ were recorded. The results revealed that guar seed yield was the highest at 30 cm row spacing, suggesting there by that the guar crop is highly sensitive to row spacing. The new guar strain S-4002 gave significantly higher grain yield of 1372 kg ha$^{-1}$, while the next promising variety was BR-99 that produced 1310 kg ha$^{-1}$.

**Keywords:** *Cyamopsis tetragonoloba*; strains, row spacing, yield components

## INTRODUCTION

Guar [*Cyamopsis tetragonoloba* (L) Taub] is a drought tolerant summer annual legume. It is well adapted to arid and semi-arid regions of the Punjab (Thal) and Sind (Thar). It was grown on an area of 78.118 thousand hectares with annual production of 50.613 thousand tons (Anonymous, 2010-11) during 2010-11 in Punjab. It is a principal source of galactomannan (guar gum) for the country and has numerous food and industrial uses. It is also used for green manuring, feed for cattle and poultry, as vegetable and fodder.

Guar yield in our country is extremely low and has been static over the past several decades. This may probably be due to the fact that a very few investigations have been made to investigate the agronomic requirements of this crop for high grain yields.

Among the other crop production factors, the row spacing contributes much to a proper crop stand establishment in the field. Production may be favourable on narrowing spacing. Narrowing row spacing might give the plant more erect upright plant architecture. Mahmood *et al.* (1988) reported that guar varieties responded differently to row spacings. The best yield was obtained at 45 cm spaced rows. Williams (1960) conducted a field trial to see the effect of row spacing and plant density on guar and found that crop grown in 50 cm spaced rows produced higher seed yields than that grown 75 or 100 cm apart rows. Hymowitz and Matlock (1964) found the best spacing for guar cultivars used in their study was 50 cm. Bains and Dhillon (1975) reported that yield reductions occurred when row to row spacing's was increased from 30 to 45 cm. Similarly, Sharma *et al.* (1984) recorded the higher seed yield in rows 30 cm spaced than those grown in rows 45 to 60 cm apart. The sole aim of present study was to find out the optimum row spacing for maximum possible yield of newly developed promising guar strains under irrigated conditions.

## MATERIALS AND METHODS

The experiment was conducted at the Agricultural Research Station, Bahawalpur to find out the effect of various row spacings on the growth and yield of different guar varieties in 2010-11. Replicated three times experiment was laid out in spilt plot design randomizing with a net plot size of 7.2 m × 1.8 m. The experimental treatments comprised row spacings of 30, 45 and 60 cm and the varieties were BR-99, BR-99 Super and S-4002. The crop was sown on June 14$^{th}$ with a single row hand drill on a well prepared seed bed using a seed rate of 25 kg ha$^{-1}$ and was harvested on November 12$^{th}$. A basal dose of 40 kg $P_2O_5$ + 20 kg N ha$^{-1}$ in the form of single super phosphate and urea, respectively, was used in the trial. The whole fertilizer was applied at sowing time. Three irrigations were applied, i.e. first at start of flowering and 2$^{nd}$ and 3$^{rd}$ during pod formation. Data on plant height, number of branches per plant, number of pods per plant, pod length, number of grains/pod, 1000-grain weight and grain yield were recorded. The analysis of variance and LSD at five percent probability level were used to test the significance of treatment means (Steel *et al*., 1997).

## RESULTS AND DISCUSSION

The data pertaining to grain yield and other related traits are presented in Table 1. A perusal of the data revealed that the plant height was significantly ($P<0.05$) influenced by various row spacing treatments (Table 2). There was a gradual increase in plant height with the increase of row spacing up to 60 cm and grew significantly taller (209 cm)

than plants growing at a row spacing of 45 and 30 cm (198 & 155 cm) (Table 2). The greater plant height at 60 cm spacing (209 cm) was attributed to relatively thick stand within the row which encouraged vertical growth of the plants rather than the vegetative growth. Strains, S-4002 (203 cm) and BR-99 Super (213 cm) were at par with each other and grew significantly taller than BR-99 (179 cm). The variation in plant height of the varieties used may be attributed to their genetic variability. Different spacing treatments were significant ($P<0.05$) regarding number of branches plant$^{-1}$. It is interesting to note that row spacing of 45 and 60 cm appeared equally effective for number of branches plant$^{-1}$. The differences among the varieties were non- significant. BR-99 and S-4002 produced significantly lesser branches plant$^{-1}$ (179 and 203, respectively) than BR-99 Super (213) (Table 2). The results further indicated that the inherent branching potential of BR-99 and S-4002 is much lower than that of BR-99 Super.

The data given in Table 1 revealed that number of pods plant$^{-1}$ under various row spacing differed significantly ($P<0.05$) while the strains showed statistically similar number of pods plant$^{-1}$. BR-99 Super and BR-99 produced significantly greater number of pods plant$^{-1}$ (122 & 121, respectively) as compared to S-4002 (61). The lesser number of pods plant$^{-1}$ for 60 cm row spacings were due to high plant density per unit area. Maximum number of pods plant$^{-1}$ (107) was found in row spacing of 30 cm (Table 2).

Row spacing had non-significant effect on number of grains pod$^{-1}$ while BR-99 Super had significantly more number of grain pods$^{-1}$ (8.0) as compared to BR-99 (7.78) and S-4002 (6.78) (Table 2). Pod length was not significantly affected by various row spacings ($P=0.093$). However, maximum pod length of 6.33 cm was observed for BR-99 Super while other two varieties were at par with each other.

It was observed that there were no significant differences in 1000-grain weight at different row spacings. However, the differences among the varieties were statistically significant (Table 1). Variety S-4002 gave the higher 1000-grain weight of 37.0 g followed by BR-99 Super (32.90 g) for this character and BR-99 which had 1000-grains weight of 31.6 g (Table 2).

The data on grain yield ha$^{-1}$ revealed that various row spacing treatments showed significant ($P<0.05$) differences among themselves. The grain yields of 1440, 1339 and 1203

**Table 1. Response of promising guar strains to various row spacing**

| Row spacing | Varieties | Grain yield (Kg ha$^{-1}$) | Plant height (cm) | Branches plant$^{-1}$ | Pods plant$^{-1}$ | Pod length (cm) | Grains pod$^{-1}$ | 1000-grain weight (g) |
|---|---|---|---|---|---|---|---|---|
| 30 cm | BR-99 | 1378 | 155 | 0.33 | 129.33 | 5.33 | 7.67 | 32.4 |
| | BR-99 | 1306 | 210 | 0.67 | 137.33 | 6.00 | 8.33 | 30.3 |
| | BR-99 | 1245 | 173 | 0.67 | 96.67 | 6.00 | 7.33 | 32.1 |
| 45 cm | S-4002 | 1568 | 188 | 4.00 | 59.67 | 5.67 | 7.33 | 33.4 |
| | S-4002 | 1344 | 205 | 3.67 | 59.67 | 5.00 | 6.67 | 32.8 |
| | S-4002 | 1203 | 215 | 5.00 | 63.33 | 5.00 | 6.33 | 32.6 |
| 60 cm | BR-99 S | 1373 | 222 | 0.67 | 128.67 | 6.67 | 8.33 | 36.3 |
| | BR-99 S | 1366 | 211 | 0.67 | 122.67 | 6.33 | 7.67 | 38.1 |
| | BR-99 S | 1162 | 207 | 0.67 | 115.33 | 6.00 | 8.00 | 36.5 |
| **RS** | | 0.095 | 0.04 | 0.001 | 0.012 | 0.093 | 0.026 | 0.060 |
| **V** | | 0.000 | 0.098 | 0.227 | 0.115 | NS | 0.135 | 0.040 |
| **RS x V** | | 0.184 | 0.050 | 0.302 | 0.177 | 0.063 | 0.159 | 0.214 |
| **LSD** | | 94.41 | 24.46 | 1.14 | 34.47 | - | 0.796 | 1.23 |
| **CV %** | | 6.93 | 9.12 | 32.68 | 15.32 | 7.45 | 7.24 | 12.35 |

**Table 2. Consolidated data of various traits regarding guar strains and various row spacing**

| Row spacing | Grain yield (Kg ha$^{-1}$) | Plant height (cm) | Branches plant$^{-1}$ | Pods plant$^{-1}$ | Pod length (cm) | Grains pod$^{-1}$ | 1000-grain weight (g) |
|---|---|---|---|---|---|---|---|
| 30 cm | 1444 | 155 | 1.67 | 107 | 5.89 | 7.78 | 34.0 |
| 45 cm | 1339 | 198 | 1.67 | 106 | 5.78 | 7.56 | 33.7 |
| 60 cm | 1203 | 209 | 2.11 | 92 | 5.67 | 7.22 | 33.7 |
| **Varieties** | | | | | | | |
| BR-99 | 1310 | 179 | 0.56 | 121 | 5.78 | 7.78 | 31.6 |
| S-4002 | 1372 | 203 | 4.22 | 61 | 5.22 | 6.78 | 37.0 |
| BR-99 S | 1300 | 213 | 0.67 | 122 | 6.33 | 8.00 | 32.9 |

kg $ha^{-1}$ were obtained at row to row spacings of 30, 45 and 60 cm, respectively (Table 2). These observations were contradictory to Williams (1960), Hymowitz (1964), Bains (1975) and Mahmood *et al.* (1988) but supported by Brooks (1950) who reported yield differences among plant population and row spacing. Moreover, the results of these studies get support from the finding of Sharma *et al.* (1984) who observed that the seed yield in rows of 30 cm apart were higher than in 45 and 60 cm apart rows. Variety S-4002 produced significantly higher grain yield (1372 kg $ha^{-1}$) while BR-99 and BR-99 Super stood second and third, respectively, regarding grain yield $ha^{-1}$ (Table 2).

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