



## Influence of Plant Population and Varieties on Growth and yield of Clusterbean (*Cyamopsis tetragonoloba*) in Vertisols of A. P

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### ABSTRACT

A field experiment was conducted at Regional Agricultural Research station, Lam Farm, Guntur during kharif, 2012 season to find out the optimum plant population and suitable varieties of clusterbean for vertisols of Andhra Pradesh under rain fed condition. Number of branches, clusters and pods per plant increased by 18%, 15% and 24% respectively, under wider spacing (60x20cm) when compared with closer spacing (60x10cm). Though the no. of branches, clusters and pods per plant recorded were lower under closer spacing, as the plant stand was double and that has contributed for increased yield by 31% (853kg/ha) when compared to wider spacing (593kg/ha). GG 1 recorded the highest grain yield (820 kg/ha) which was significantly superior to all the other varieties tested (RGC 936, RGC 1033, GG2 and RGC 1038) in vertisols of Andhra Pradesh under rain fed situation. Similar trend was also observed in respect of BCR.

**Key words :** Clusterbean, Plant Population and Vertisols.

Clusterbean popularly known as Guar is an important leguminous crop. The guar gum powder is the main byproduct of guar which has export potential as well as industrial uses particularly in mining, petroleum drilling and textile manufacturing sectors. Being a drought hardy plant, it is well adapted to arid and semi arid regions of the country such as Rajasthan, Haryana and Gujarat comprising almost 93% of total production in the country. The clusterbean is tall and bushy annual legume mostly grown on sandy soils of arid and semi arid regions of India, Pakistan and United States (Undersander et al., 2006). India leads the list of major guar producing countries of the world contributing almost 80% to the global production of about 8 to 10 lakh tons. Of late, it has caught the attention of the farmers of Andhra Pradesh for high returns from seed, that has got great industrial importance owing to presence of gum (Galactomannan) in its endosperm, which constitutes about 30–32% of the whole seed. Therefore, considering the growing export demand and its industrial use, there is a need to find out suitable varieties with high yield and gum content and also optimum spacing required for enhancing productivity and quality of seed. However, no literature is available in this regard particularly for vertisols of coastal region.

Trials on sowing methodologies conducted under the aegis of National Network Research Projects on Arid Legumes reveal that the recommended spacing should be 10-15 cm plant to plant distance in a row and 35-60 cm row to row distance on the basis of rainfall, soil type and inputs availability. For instance, those regions having still higher rainfalls (550-600 mm) planting pattern of 30x 10 cm has been observed optimum and maximum grain yield can be harvested with 200,000 plants/ ha (Hema and Shalendra, 2014).

### MATERIAL AND METHODS

A field experiment was conducted at Regional Agricultural Research Station, Lam, Guntur during Kharif 2012 season to find out the effect of plant population and suitable varieties on growth and yield of clusterbean for vertisols of Andhra Pradesh under rainfed condition. The soil of the experiment is Clayey in nature with 55.15% clay, Soil P<sup>H</sup> is 7.55, medium in organic carbon (0.55%), low in available Nitrogen, medium in available phosphorus and high in available potash. The experiment was laid out in a Randomized Block Design with Factorial concept and replicated thrice. The treatments consists of two spacing's (60x10 cm and 60x20 cm) and 5 varieties (V1-RGC-1031, V2-RGC-936, V3-RGC-1003, V4-GG-1 and V5-

Table 1. Growth and Yield of cluster bean varieties at varied spacings in vertisols of Andhra Pradesh.

Treatment	Plant height (cm)	No. of branches/ Plant	No. of clusters/ Plant	No. of pods/Plant	Grain Yield (kg/ha)
Spacing(S)					
S1-60x10cm	81	7.1	14.9	47.8	853
S2-60x20cm	66	8.6	17.5	62.6	593
SEm $\pm$	2.39	0.26	0.52	1.58	19.2
CD (P=0.05)	7.11	0.79	1.54	4.7	57.0
Varieties(V)					
V1 (RGC-1031)	75.5	6.9	16.8	57.5	715
V2 (RGC-936)	70.0	7.5	14.9	49.5	665
V3 (RGC-1003)	74.5	7.7	15.4	52.0	690
V4 (GG-1)	75.0	8.5	18.4	62.5	820
V5 (GG-2)	72.5	8.6	15.5	54.5	725
SEm $\pm$	3.79	0.42	0.82	2.5	30.3
CD (P=0.05)	NS	1.24	2.44	7.4	90.0
Interaction	NS	NS	NS	NS	NS

GG-2). Fertilizers were applied as per the treatments and data are collected on plant height, No. of branches per plant, No. of pods per plant and grain yield. Cost of cultivation was also calculated and finally BCR was estimated.

## RESULTS AND DISCUSSION

### Growth and yield

Plant height increased significantly under closer spacing (60 x 10 cm) as compared to wider spacing, where as no. of branches, clusters and pods per plant increased significantly under wider spacing (60 x 20 cm) as compared to closer spacing. This might be because of better utilization of natural resources in terms of space and light, which attributed for better growth and development. No. of branches, clusters and pods per plant were increased by 18%, 15% and 24% respectively, under wider spacing. Though the no. of branches, clusters and pods per plant recorded were lower under closer spacing but the plant stand was double per unit area, which has been really contributed for increased yield by 31% under closer spacing (853kg/ha). Siddaraju *et al.*, (2010) from Bangalore recorded significantly higher seed yield with closer spacing (45x15 cm) when compared with wider spacing of 60x30 cm both during kharif and summer seasons. Similar results were also reported by Lal Hussain *et al.*, (2012) with closer spacing

There was no significant difference in plant height among the genotype tested. However, the highest no. of branches per plant was recorded with GG 2 which was significantly superior to RGC 1031 but was on far with rest of the cultivars. No. of clusters and pods per plant increased significantly with GG 1 which was significantly superior to RGC 1031 but was on par with rest of the varieties. Therefore, GG 1 recorded the highest grain yield (820 kg/ha) which was significantly superior among all the other varieties tested in vertisols of Andhra Pradesh under rain fed situation (table 1). Rawat and Rajput (2013) observed significant difference in grain yield among different varieties of clusterbean and recorded highest grain yield and B.C ratio with HG 100 when compared to other varieties tried.

### Economics

Closer spacing (60x10cm) recorded the highest net returns (Rs.60,780/ha), which was significantly superior to 60x20cm spacing. This might be because of higher plant stand accommodated under closer spacing that has been attributed to higher yield as well as higher net returns and consequently resulted into greater BCR (3.48). GG1 recorded the highest grain yield, net returns and BCR (3.39), which was significantly superior as compared to rest of the varieties under study (Table 2).

Table 2. Yield and economics of cluster bean varieties at varied spacings in vertisols of Andhra Pradesh.

Treatment	Grain Yield (kg/ha)	Net returns (Rs/ha)	BCR
Spacing (S)			
S1-60x10cm	853	60780	3.48
S2-60x20cm	594	35616	2.50
SE m ±	19.2	1917	0.08
CD (P=0.05)	57.0	5694	0.24
Varieties (V)			
V1 (RGC-1031)	715	47375	2.95
V2 (RGC-936)	665	42375	2.75
V3 (RGC-1003)	690	44925	2.85
V4 (GG-I)	820	57875	3.39
V5 (GG-2)	726	48441	3.00
SE m ±	30.3	3031	0.13
CD (P=0.05)	90.0	9003	0.37
Interaction	NS	NS	NS

From the results it can be concluded that closer spacing of 60x10 cm is optimum for getting higher seed yield of clusterbean while GG1 followed by GG2 was found to be suitable for vertisols of Andhra Pradesh during kharif season under rainfed conditions to realize higher grain yields and also BCR.

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