Biological Forum – An International Journal **14(2): 1494-1498(2022)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Genetic Evaluation of Cluster bean (*Cyamopsis tetragonoloba* L. Taub.) Genotypes for Quality Traits Over Three Locations

R. Ravi Teja[1*], P. Saidaiah[2], A. Kiran Kumar[3], K. Bhasker[4] and A. Geetha[5]

[1]Department of Vegetable Science, College of Horticulture-Rajendranagar, Sri Konda Laxman Telangana State Horticultural University, Mulugu (Telangana), India.

[2]Associate Professor, Department of Genetics and Plant Breeding, College of Horticulture- Mojerla, Wanaparthy,Sri Konda Laxman Telangana State Horticultural University (Telangana), India.

[3]Comptroller and Director of Extension, Department of Horticulture, Sri Konda Laxman Telangana State Horticultural University, Mulugu (Telangana), India.

[4]Scientist, Department of Genetics and Plant Breeding, JVR HRS, Malyal, Mahabubabad, (Telangana), India.

[5]Scientist, Department of Crop Physiology, RARS, Palem, PJTSAU, (Telangana), India.

(Corresponding author: R. Ravi Teja)*

(Received 22 April 2022, Accepted 17 June, 2022)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Despite of crops high demand, only less breeding work was done and less attention has been paid for genetic improvement of quality attributes. Before developing any superior variety with superior quality, it is necessary to compare the performance of the genotypes with best performing variety, aim of this study is to identify the superior quality genotypes. During *Kharif*, 2019, twenty-four genotypes and one check variety, were evaluated in Completely Randomized Block Design replicated thrice at three environments representing three Telangana agroclimatic Zones: PG Research Block, COH, Rajendranagar, Hyderabad (Southern Telangana Zone), progressive farmers field at Karimnagar (Northern Telangana Zone) and JVR HRS, Malyal, Mahabubabad (Central Telangana Zone). Significant differences were observed between genotypes. Protein content, crude fibre content in the pod and gum content in the seed's endosperm were estimated. Protein content was found highest in genotypes IC-28287 (23.86 percent) and IC-13348 (23.55 percent). The genotype IC-9077-P1 had the highest crude fibre content (4.36 percent), whereas IC-28269 had the lowest fibre content (8.71 percent). The gum content in cluster bean genotypes IC-103295 (33.02 percent) and IC-9077-P1 (32.17 percent) was determined highest. As a result, these germplasm can be utilized as such or can further be subjected to further selection or breeding programmes to develop a desirable variety of cluster bean suitable for rainfed environments.

Keywords: Cluster bean, crude fibre content, protein content, gum content.

INTRODUCTION

Cyamopsis tetragonoloba L. Taub., commonly known as guar, with the diploid chromosome number 2n=2x=14. It is a self-pollinated crop from the family Fabaceae. Cluster bean is short-day erect or bushy annual plant native to India and Pakistan (Purseglove, 1981). It is a drought-tolerant, legume crop with a well and deep root system that is mostly cultivated as a rain-fed crop in dry and semi-arid environments during the rainy season as a vegetable, as fodder crop and green manure crop. Guar enhances soil productivity by fixing atmospheric nitrogen for its own needs as well as those of the following crop (Bewal *et al*., 2009). Guar can be grown successfully in soils where no other crops can thrive. It can grown in saline soils and slightly alkaline soils with pH ranging from 7.5 to 8.0. (Venkataratnam, 1973). It is cultivated mostly in the arid habitats of Rajasthan, Gujarat, Haryana and Punjab,and to a lesser extent in Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Telangana, Tamil Nadu, Kerala and Karnataka. In India area under cultivation of beans is 0.23 million ha with production of 2 million tonnes. Gujarat is the state with the largest area under beans cultivation with 0.07 million hac with 0.72 million tonnes of production (NHB, 2018-19). From outside to inside, the dicotyledonous seed of cluster bean is made up of three primary fractions: the hull or husk with 14%-17%, endosperm ranges from 35%-42%, and the germ consists about 44%-47%. The germ and hull part, known as guar meal, obtained after gum extraction is high in protein, ranging from 28.90 to 46.00 percent. The endosperm portion of cluster bean seed contains a high concentration of galactomannan (polysaccharide), ranging from 16.80 to 30.90%. (Lee *et al*., 2004; Rodge, 2008). Additionally, the seed contains 30-35 % protein, 26.8-32.2 % gum, 6.1-7.7 % oil, and 2.99-3.75 % minerals. Guar gum is a seed with a thick endosperm that contains galactomannan gum, which forms a gel in water. Guar gum is often used as a stabiliser in various

culinary items such as ice cream, fruit drinks, chocolate, milk and milk products, cake tops, and so on. These characteristics have made it the most popular crop among marginal farmers in dry locations.

In view of the importance of gaur, there is major necessity for its improvement. In spite of of crops high demand, less breeding work has done and less attention has been paidtogenetic improvement of quality attributes. Rai *et al*. (2012); Malaghan *et al*. (2013); Jitendar *et al*. (2014); Vikas and Ram (2015); Goudar *et al*. (2017); Santhosha *et al*. (2017); Rajashekar *et al*. (2018); Yeswanth *et al*. (2019); Shobiya *et al*. (2019) as sessedgaur genotypes for yield and quality traits characters and reported some superior genotypes and stated that these superior germplasm can be exploited extensively in future breeding programmes for exploitation of desirable characters. Hence, they may be suggested for cultivation after stability analysis and multilocational trials. Farmers in many areas were unaware of the value of this crop. As a result, evaluating various guar cultivars and identifying optimal cultivars for this location is highly recommended.

However, before developing a superior variety, it is necessary to compare the performance of exsisting germplasm to the highest performing variety in different agro-climatic zones. The current experiment was undertaken to investigate the mean performance of the genotypes in order to identify superior quality traits among the genotypes.

MATERIALS AND METHODS

During *Kharif*, 2019, twenty-four genotypes of cluster bean augmented from ICAR-NBPGR, Regional Station, Jodhpur, including a check variety Pusa Navbahar, from IARI, New Delhi, was evaluated in a Completely Randomized Block Design replicated thrice at three environments representing three Telangana agroclimatic Zones: PG Research Block, COH, Rajendranagar, Hyderabad (Southern Telangana Zone), farmers field at Karimnagar (Northern Telangana Zone) and JVR HRS, Malyal, Mahabubabad (Cental Telangana Zone). Crude gum content (%) in gaur seed was estimated by the procedure developed by Das *et al*. (1977), protein content of the sample was estimated using AOAC (2005) micro Kjeldhal method, calculated as protein nitrogen product and multiplied with 6.25 to obtain the protein content and crude fibre content of samples was determined by boiling with 1.25 percent dilute H_2SO_4, washed with water, further boiled with 1.25 percent dilute NaOH and the remaining residue after digestion was taken as crude fiber (AOAC, 1990).

RESULTS AND DISCUSSIONS

Table 1 shows the findings of the ANOVA for 24 genotypes and a control variety of cluster bean. The mean sum of squares for treatments (genotypes) was significant for all three characteristics investigated, namely crude fibre content (percent), protein content (percent), and gum content. ANOVA revealed that genotypes differed significantly among themselves for all of the traits under study, representing the presence of sufficient variability, whereas replications for all of the characters were non-significant, representing that environmental error was sufficiently eliminated.

Table 1: Analysis of Variance for 25 cluster bean genotypes.

Trait	Replication Mean Sum of Square (df=2)			Treatment Mean Sum of Square (df=24)			Error Mean Sum of Square (df=48)		
Environment	HYD	KRNR	MLYL	HYD	KRNR	MLYL	HYD	KRNR	MLYL
Crude protein content (%)	2.15	0.21	1.05	16.92	21.9	21.04	0.37	0.75	0.51
Gum content (%)	4.17	3.76	2.52	60.82	71.04	66.37	0.459	0.67	0.68
Crude fibre content (%)	0.14	0.022	0.07	6.03	5.33	5.11	0.113	0.15	0.131

Protein content (%). Protein content ranged from 15.30 percent to 24.11 percent at the Hyderabad (Southern Telangana Zone), (Table 2), with grand mean of 20.58 percent. Genotype IC-28287 (24.11 percent) had the highest protein content, whereas the genotype IC-200680 (15.30 percent) had the low protein content. Genotypes, IC-13348 (23.75 percent) and IC-9052 (23.13 percent), were statistically equivalent to IC-28287's protein content (24.11 percent). Fifteen genotypes had values that were considerably greater than the grand mean of 20.58 percent. Twenty-one genotypes had superior values than the check variety Pusa Navbahar (18.71 percent).

Protein content ranged from 13.65 percent to 23.84 percent in the Karimnagar (Northern Telangana Zone) (Table 2), with overall mean of 19.40 percent. Genotype IC-28287 (23.84 percent) had the highest protein content, whereas the genotype IC-200680 (13.65 percent) had the low protein content.

Genotypes, IC-13348 (23.35 percent) and IC-9052 (22.97 percent), were statistically equivalent to IC-28287's protein content (23.84 percent). Fourteen genotypes had values that were significantly greater than the grand mean of 19.40 percent. Eighteen genotypes had greater protein content than the check variety Pusa Navbahar (18.63 percent).

For protein content, the genotypes at Malyal environment (Cental Telangana Zone)had a general mean of 19.50 percent and varied from 13.68 percent to 23.63 percent (Table 2). The genotype IC-28287 (23.63 percent) had the highest protein content, whereas the genotype IC-200680 (13.68 percent) had the low protein content. Genotypes, IC-13348 (23.56 percent) and IC-9052 (22.87 percent), were statistically equivalent to IC-28287's protein content (23.63 percent). Fifteen genotypes exhibited values that were considerably greater than the grand mean of 19.50 percent. Sixteen genotypes out performed the check cultivar Pusa Navbahar (18.73 percent).

The mean values for from three locations ranged from 15.3 percent in IC-9077-P1 to 23.86 percent in IC-28287, with a general mean of 19.83 percent. The

protein content (percent) of fifteen genotypes IC-9052, IC-9229-P3, IC-9233-P3, IC-10323, IC-10333, IC-10520, IC-13348, IC-13365, IC-28286, IC-28287, IC-34344, IC-103295, IC-140777, IC-200696, and IC-200715 was greater than the general mean (19.83 percent).

The results of this quality trait are consistent with those of Malaghan *et al.* (2013); Kapoor (2014); Santhosha *et al.* (2017); Yeswanth *et al.* (2019) in gaur.

Table 2: Environmental wise mean performance of genotypes for protein content (%), gum content (%) and crude fibre content (%) in cluster bean.

Genotype	Protein content (%)				Gum content (%)				Crude fibre content (%)			
	HYD	KRNR	MLYL	POOLED	HYD	KRNR	MLYL	POOLED	HYD	KRNR	MLYL	POOLED
IC-9052	23.13	22.97	22.87	22.98	27.27	26.55	26.92	26.91	5.55	5.61	5.74	5.63
IC- 9077-P1	15.80	14.97	15.13	15.30	32.17	32.17	32.07	32.17	4.22	4.49	4.37	4.36
IC-9229-P3	22.18	21.97	22.42	22.18	25.63	25.63	25.50	25.80	5.13	5.13	5.13	5.13
IC-9233-P3	21.80	20.13	20.13	20.68	21.72	21.65	22.21	21.80	6.52	6.52	6.52	6.51
IC-10323	22.53	20.90	20.93	21.45	32.47	32.37	32.47	32.46	7.32	7.98	7.85	7.71
IC-10333	22.25	21.08	21.03	21.45	20.27	19.85	20.33	20.14	5.96	6.24	6.30	6.16
IC-10520	22.33	21.97	21.80	22.03	26.35	26.49	24.23	25.60	8.16	7.70	7.70	7.85
IC-13348	23.75	23.35	23.56	23.55	18.06	16.11	17.13	17.09	7.32	7.32	7.32	7.31
IC-13365	21.59	19.47	19.70	20.50	23.30	22.48	22.61	22.79	8.14	8.10	8.12	8.11
IC-28269	18.77	17.38	17.62	17.92	21.33	21.33	21.33	21.3	8.87	8.52	8.77	8.71
IC-28283	19.24	18.02	18.16	18.47	20.96	19.53	19.93	20.14	4.85	5.09	5.17	5.03
IC-28286	21.69	20.03	20.53	20.75	22.43	21.38	21.99	21.93	6.44	6.44	6.44	6.44
IC-28287	24.11	23.84	23.63	23.86	21.22	20.44	20.62	20.7	6.90	7.26	6.82	6.9
IC-34344	22.48	22.18	22.13	22.26	31.50	31.10	31.45	31.3	8.70	8.70	8.70	8.7
IC-39989	19.04	16.64	16.17	17.28	26.83	24.65	24.48	25.32	8.17	8.17	8.26	8.19
IC-103295	22.17	20.97	21.03	21.38	33.17	32.81	33.10	33.02	6.53	5.80	6.56	6.29
IC-140774	19.23	16.79	17.98	18.00	31.40	31.33	31.23	31.3	5.39	5.32	5.37	5.36
IC-140777	21.24	19.07	19.83	20.04	22.27	20.02	20.76	21.00	6.12	6.21	6.36	6.22
IC-140791	18.27	16.03	16.37	16.8	31.40	30.08	30.03	30.5	7.93	7.89	7.96	7.90
IC-177844	19.13	17.46	17.78	18.12	25.40	23.05	23.18	23.8	5.47	5.66	5.85	5.60
IC-200679	17.17	16.86	16.59	16.87	25.60	23.10	23.30	24.00	6.15	6.07	6.46	6.22
IC-200680	15.30	13.65	13.68	14.20	22.03	19.95	20.20	20.72	4.70	4.84	5.13	4.80
IC-200696	21.40	20.78	19.50	20.56	22.33	20.40	20.70	21.14	4.78	5.27	4.97	5.00
IC-200715	21.35	20.10	20.40	20.61	29.63	27.40	27.87	28.30	4.47	4.64	4.92	4.67
PusaNavbahar	18.71	18.63	18.73	18.69	28.23	27.97	28.10	28.10	4.81	4.90	5.15	4.95
General mean	20.58	19.40	19.50	19.83	25.71	24.71	24.87	25.10	6.34	6.39	6.47	6.40
S.E.(m)	0.49	0.70	0.58	0.21	0.55	0.67	0.67	0.28	0.27	0.31	0.29	0.13
C.D. at 5%	1.00	1.42	1.18	0.51	1.11	1.35	1.36	0.67	0.52	0.64	0.59	0.32

HYD: Hyderabad, KRNR: Karimnagar, MLYL: Malyal

Gum content (%). The mean values for gum content (Table 2) ranged from 18.06 percent to 33.17 percent, with a grand mean of 25.71 percent at Hyderabad location. The genotype IC-103295 had a substantially greater gum content (33.17 percent), while the genotype IC-13348 had a suggestively lower gum content (18.06 percent). Three genotypes, IC-10323 (32.47%), IC-140774 (31.40%), and IC-9077-P1 (32.17%), were statistically equal to IC-103295 (33.17 percent). Twelve genotypes had values that were considerably higher than the overall mean of 25.71 percent. Seven genotypes had greater gum content than the control variety Pusa Navbahar (28.23 percent).

Gum content ranged from 16.11 percent to 32.81 percent in the Karimnagar location, with grand mean of 24.71 percent (Table 2). The genotype IC-103295 had a substantially greater gum content (32.81 percent), whereas the genotype IC-13348 had a significantly low gum content (16.11 percent). Three genotypes, IC-10323 (32.37%), IC-140774 (31.33%), and IC-9077-P1 (32.17%), were statistically equivalent to IC-103295 (32.81 percent). Eleven genotypes had results that were significantly higher than the overall mean of 24.71 percent. Six genotypes had greater gum content than the control variety Pusa Navbahar (27.97 percent).

Genotypes at the Malyal environment reported an overall mean of 24.87 percent for gum content, with a range of 17.13 percent to 33.10 percent (Table 2). The genotype IC-103295 had a substantially greater gum content (33.10 percent), while the genotype IC-13348 had a significantly low gum content (17.13 percent). Three genotypes, IC-10323 (32.47%), IC-140774 (31.23%), and IC-9077-P1 (32.07%), were statistically equivalent to IC-103295 (33.10 percent). Eight genotypes showed results that were significantly higher than the general mean of 24.71 percent. Six genotypes had greater gum content than the control cultivar Pusa Navbahar (28.10 percent).

Based on the mean performance of 24 genotypes computed across three locations, gum content (percent) ranged from 17.07 percent in IC-13348 to 33.02 percent in IC-103295. Eleven genotypes were found to have greater gum content (percent) than the general mean: IC-9052, IC-9077-P1, IC-9229-P3, IC-10520, IC-34344, IC-10323, IC-39989, IC-103295, IC-140774, IC-140791, IC-200715, and Pusa Navbahar (25.103 percent). Seven genotypes have greater gum content than the check cultivar Pusa Navbahar (28.1 percent). These results were consistent with those of Rajashekar *et al.* (2018); Shobiya *et al.* (2019); Yeswanth *et al.* (2019)

Crude fibre content (%). Mean values for fibre content in Hyderabad environment ranged from 4.22 percent to 8.87 percent, with a grand mean of 6.34 percent (Table 2). Genotype IC-28269 (8.87%) had much greater fibre content, whereas the genotype IC-9077 P1 (4.22%) had significantly lower crude fibre content. One genotype, IC-34344 (8.70 percent), was

statistically equivalent to the high fibre content genotype, IC-28795 (8.87 percent). The fibre content of twelve genotypes was considerably greater than the grand mean of 6.34 percent.

The fibre content in Karimnagar environment ranged from 4.49 percent to 8.70 percent. The genotype IC-34344 (8.7 percent) had much greater fibre content, while the genotype IC-9077 P1 (4.49 percent) had significantly lower fibre content (Table 4.2.6). Genotype, IC-28269 (8.52 percent), was statistically equal to the high fibre content genotype, IC-34344 (8.7 percent). Eleven genotypes had considerably greater fibre content than the overall mean of 6.34 percent.

For fibre content, the genotypes at Malyallocation showed an overall mean of 6.47 percent ranges from 4.37 percent to 8.77 percent. The genotype IC-28269 (8.77 percent) had much greater fibre content, while the genotype IC-9077-P1 (4.37 percent) had significantly lower crude fibre content. One genotype, IC-34344 (8.7 percent), was statistically equivalent to IC-28269 (8.77 percent). Eleven genotypes had considerably greater fibre content than the overall mean of 6.477 percent (Table 2).

The mean fibre content (percent) values at three sites ranged from 4.36 percent in IC-9077-P1 to 8.7 percent in IC-34344, with a general mean of 6.405 percent (Table 2). Ten genotypes *i.e.,* IC-9233-P3, IC-10323, IC-10520, IC-13348, IC-13365, IC-28269, IC-28287, IC-34344, IC-39989, IC-140791, had significantly higher fibre content (percent) means than the general population mean (6.405), while the remaining fifteen genotypes *viz,* IC-9052, IC- 9077-P1, IC-9229-P3, IC-28283, IC-28286, IC-10333, IC-103295, IC-140774, IC-140777, IC-177844, IC-200680, IC-200696,IC-200679, IC-200715 and Pusa Navbahar were reported lesser fibre percentage. These findings are supported by Rajashekar *et al.* (2018); Shobiya *et al.* (2019).

CONCLUSION

In any selection programme, the mean performance of germplasm for individual trait is an important criteria for removal undesirable types. This demonstrated that the material examined might serve as a potential source of quality traits such as protein content was found highest in genotypes IC-28287 (23.86 percent) and IC-13348 (23.55 percent), genotype IC-9077-P1 had the highest crude fibre content (4.36 percent), whereas IC-28269 had the lowest fibre content (8.71 percent). The gum content in cluster bean genotypes IC-103295 (33.02 percent) and IC-9077-P1 (32.17 percent) was determined highest. As a result, these germplasm can be utilized as such or can further be subjected to further selection or breeding programmes to develop a desirable variety of cluster bean with desirable quality traits.

FUTURE SCOPE

The current findings will be useful in developing a selection strategy for identifying parent materials in a collection of germplasm as well as selecting elite plant types in a cluster bean breeding programme under varied environmental conditions.

Acknowledgement. I would like to express my thankfulness towards my chairman and my advisory committee for sharing their valuable resources and giving me timely help. I would also like express my gratitude to COH- Rajendranagar, SKLTSHU, Mulugu, Telangana.

Conflict of Interest. None.

REFERENCES

AOAC. (1990). Official methods of analysis for fiber. *Association of Official Analytical Chemists. 14th edition,* Washington DC.USA.

AOAC. (2005). Official methods of analysis for protein. *Association of Official Analytical Chemists,*18th edition. Arlington VA 2209.

Bewal, S., Purohit, J., Kumar, A., Khedasana, R. and Rama Rao, S. (2009). Cytogenetical investigations in colchicine induced tetrapods of (*Cyamopsis tetragonoloba* L.). *Czech Journal of Genetics and Plant Breeding, 45*: 143-154.

Das, B., Arora, S. K. and Luthra, Y. P. (1977). A rapid method for determination of gum in guar (*Cyamopsis tetragonoloba*(L.) Taub.). *Proceedings of I*st *ICAR Guar Research Workshop, Jodhpur*, 117–123.

Girish, M. H, Gasti, V. D., Shantappa, T., Thammaiah, N., Mastiholi, A. B., Kerutagi, M. G. and Mulge, R. (2013). Genetic variability studies in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub.). *Karnataka Journal of Agricultural Science*, *26* (3): 442-443.

Goudar, R., Srinivasa, V. and Lakshmana, D. (2017). Genetic variability and divergence studies in cluster bean (*Cyamopsis tetragonoloba* L. Taub.) under hill zone of Karnataka. *India Legume Research*, *40*(2): 237–240.

Jitendar, S. K., Pahuja, S. and Bhusal, N. (2014). Genetic variability and heritability for seed yield and water use efficiency related characters in cluster bean (*Cyamopsis tetragonoloba* L. Taub.). *Forage research*, *39*(4): 170-174.

Lee, J. T., Connor, A. S., Haq, A. U., Bailey, C. A. and Cartwright, A. L. (2004). Quantitative measurement of negligible trypsin inhibitors activity and nutrient analysis of guar mean fraction. *Journal of Agricultural and Food Chemistry, 52*: 6492–6495.

Malaghan, S. N., Madalageri, M. B. and Kotikal, Y. K. (2013). Correlation and path analysis in cluster bean (*Cyamopsis tetragonoloba* L. Taub.) for vegetable pod yield and its component characters. *Genetics and Plant Breeding, 9*(4): 1609–1612.

National Horticulture Board 2018-19. *Indian Horticulture Database*, Ministry of agriculture and farmers welfare, Government of India.

Praveen, C., Dewangan, R., Kalyan, S. S. and Dinesh, S. (2018). Genetic variability studies in cluster bean (*Cyamopsis tetragonoloba* L. Taub.). *International Journal of Chemical Studies, 6*(4): 967-970.

Purseglove, J. W. (1981). Leguminosae. *Tropical Crops: Dicotyledons*. Longman Group Ltd, Essex, U.K. Pp-250-254.

Rai, P. S., Dharmatti, P. R., Shashidhar, R. V., Patil, R. V. and Patil, B. R. (2012). Genetic variability studies in cluster bean (*Cyamopsis tetragonoloba* L. Taub.). *Karnataka Journal of Agricultural Science, 25*(1):108-111.

Rajashekar, D., Saidaiah, P., Reddy, K. R., Pandravada, S. R. and Geetha, A. (2019). Genetic variability for growth, pod and quality attributes in germplasm of cluster bean (*Cyamopsis tetragonoloba* L. Taub.). *Legume Research*, *42*(5): 620–624.

Rishitha, G., Rajya Lakshmi, R., Uma Jyothi, K. and Uma Krishna, K. (2019). Studies on genetic variability,

heritability and genetic advance for yield and yield attributing characters in cluster bean (*Cyamopsis tetragonoloba* L. Taub.) *International Journal of Current Microbiology and Applied Sciences*, *8*(08): 1307–1312.

Rodge, A. B. (2008). Quality and export potential of arid legumes. *Scientific Publishers* (India), Jodhpur. 10-17.

Santhosha, G. R., Shashikanth, E., Gasti, V. D., Prabhuling, G., Rathod, V. D. and Mulge, R. (2017). Genetic variability studies in cluster bean (*Cyamopsis tetragonaloba* L. Taub.) for growth, yield and quality parameters. *Legume Research*, *40*(2): 232–236.

Shobiya, S. K. T., Kamalkumaran, P. R. and Thiruvengadam, V. (2019). Assessment of genetic variability for yield and galactomannan content in M_3 generation of cluster bean (*Cyamopsis tetragonoloba* L. Taub.). *Journal of Pharmacognosy and Phytochemistry, 8*(3): 2400–2403.

Venkataratnam, L. (1973). *Beans in India*. Directorate of Extenstion, Ministry of Agriculture, New Delhi. Pp. 64.

Vikas, K. and Ram, R. B. (2015). Genetic variability, correlation and path analysis for yield and yield attributing traits in cluster bean (*Cyamopsis tetragonoloba* L. Taub.) genotypes. *International Journal of Pure Applied Biosci*ence, *3*(1): 143–149.

Yeswanth, M, T., Syam Sundar Reddy, P., Tanuja Priya, B., Deepthi Kiran, Y. and Ramanjaneya, R, A. (2019). Genetic variability studies in cluster bean (*Cyamopsis tetragonoloba* L.). *Plant Archives*, *19*(2): 3341–3344.

How to cite this article: R. Ravi Teja, P. Saidaiah, A. Kiran Kumar, K. Bhasker and A. Geetha (2022). Genetic Evaluation of Cluster bean (*Cyamopsis tetragonoloba* L. Taub.) Genotypes for Quality Traits Over Three Locations. *Biological Forum – An International Journal*, *14*(2): 1494-1498.