Forage Res., **41** (1) : pp. 56-58 (2015) **http://forageresearch.in**
SHORT COMMUNICATION

RELATIVE PERFORMANCE OF PROMISING GENOTYPES OF CLUSTERBEAN (*CYAMOPSIS TETRAGONOLOBA* L.) UNDER DIFFERENT ROW SPACINGS AND FERTILITY LEVELS

L. K. MIDHA, B. S. DUHAN*[1] AND U. N. JOSHI

Forage Section
Department of Genetics & Plant Breeding
CCS Haryana Agricultural University,
Hisar-125 004 (Haryana), India
(e-mail : dr.bsduhan@gmail.com)

(Received : 05 March 2015; Accepted : 15 May 2015)

SUMMARY

To study the relative performance of three genotypes of clusterbean under different row spacings and fertility levels on quality, yield and yield attributes in clusterbean (*Cyamops tetragonoloba* L.), field experiment was conducted during **kharif** 2012. Results from the experiment indicated that genotype HGS100 recorded the highest number of pods/plant (48.65) followed by HGS 8-1 (46.50) and least by HG 563 (C) (40.17). Genotype HGS 8-1 recorded the highest number of seeds/pod (7.93), 100-seed weight (3.35 g), grain yield (8.85 q/ha) and gum per cent (32.52) followed by HGS 100 (7.65), (3.16 g), grain yield (8.78 q/ha) and gum per cent (30.98) followed by HG 563 (C) (6.29), (3.08 g), grain yield (7.17 q/ha) and gum per cent (30.61). Highest content of crude protein (29.57%) was recorded by HG 563 (C) followed by HGS 8-1 (28.73%) and closely followed by HG100 (28.71%). Row spacing of 45 cm was found better over 30 cm with respect to gum and protein content. Application of 20 kg N+40 kg P_2O_5/ha significantly increased the pods/plant, grain yield, gum and protein content from 40.36 to 49.84, 7.38 to 9.15 q/ha, 30.67 to 32.07 and 28.62 to 29.35 per cent, respectively, over 10 kg N+20 kg P_2O_5/ha.

Key words : Genotype, pod/plant, seeds/plant, pod length, seed weight, grain yield, gum and protein content

Clusterbean, commonly known as guar (*Cyamopsis tetragonoloba* L.), is an important legume cash crop suitable for the area of low fertility soils, low rainfall and limited irrigation facilities, especially in arid and semi-arid regions of India (Sewhag *et al.*, 2011). The clusterbean is tall and bushy annual legume mostly grown on sandy soils of arid and semi-arid regions of India. Clusterbean, being a legume crop, may help in improving the soil fertility. This legume crop is grown during **kharif** season in north-western states of India such as Rajasthan, Haryana and Gujarat. Green beans of guar are used as vegetable. This crop is used for gum production and as feed for the cattle. The endosperm of guar seed accounts for about one-third of the bean weight and contains the majority of wonderful galactomannan (gum). Approximately 90 per cent of total guar produce is used for production of commercial guar gum and rest is used for culinary purposes and cattle feed, etc. Guar gum is used in a number of industrial applications such as oil well drilling, paper, explosives, mining, etc. Highly refined guar gum is used as a stiffener in foods like ice cream, a stabilizer for cheeses, instant puddings and whipped cream substitutes. Churi and Korma are bi-products of gum industries and contain about 35 per cent of protein that can be used as cattle feed. India alone contributes more than 80 per cent of global guar production followed by 15 per cent in Pakistan. The deficient soils require nitrogen as starter dose for leguminous crop (Osborne and Riedell, 2006). The nitrogen not only improves the yield and yield components of legumes (Marton and Kadar, 1998; Baboo and Mishra, 2001) but also affects the biological nitrogen fixation (Akter *et al.*, 1998). Therefore, selection of optimum nitrogen rates is essential for better performance of both crop and inoculated rhizobia.

The field experiment was conducted to study the relative performance of promising genotypes of clusterbean (*Cyamops tetragonoloba* L.) under different

[1]Department of Soil Science.

row spacings and fertility levels at the Forage Research Farm of Chaudhary Charan Singh Haryana Agricultural University, Hisar during **khaif** 2012. The soil of the experimental field was sandy loam in texture and low in available nitrogen. Four representative soil samples were drawn from different places in the experimental field from 0-15cm depth before sowing of experimental crop. Composite samples, prepared by passing through 2 mm mesh sieve, were analyzed.

In all three genotypes, two row spacings and two fertility levels were maintained and the detail of treatments is given in Table 1. Gross plot size was 4.5 x 4 m=18 m^2 and net size was 3.5 x 3=10.5 m^2. Experiment was laid out in factorial RBD by keeping three replications. Nitrogen was applied through urea and phosphorus was applied through SSP as per the treatments. All the field operations such as hoeing, irrigation, etc. were done as and when required. Crop was harvested at maturity. The grain samples were first dried in the sun for several days and then transferred in an electric hot air oven for drying at a temperature of 60 ± 5^0C till constant weight then. After drying, the grain yield was weighed in kg/plot and then converted into q/ ha, pods per plant, seeds per pod, 100-seed weight, gum percentage and crude were determined as per standard procedure.

Pods/Plant

Data (Table 1) indicated that genotype HG100 recorded the highest number of pods/plant (48.65) followed by HGS 8-1 (46.50) and least by HG 563 (C) (40.17). Data further indicated that row to row spacing had non-significant effect on the number of pods/plant. Application of 20 kg N+40 kg P_2O_5/ha significantly increased the pods/plant from 40.36 to 49.84 over 10 kg N+20 kg P_2O_5 /ha. Deshmukh *et al.* (2014) also reported increase in number of pods per cluster with the application of RDF. Balbhim *et al.* (2015) reported the increase in number of pods per plant with the application of RDF.

Pod Length and Seeds/Pod

Data (Table 1) indicated that the differences between all these genotypes were non-significant with respect to pod length of clusterbean. Although, pod length increased slightly with increase in row spacing and fertility levels but the differences were statistically non-significant.

Data (Table 1) further indicated that genotype HGS 8-1 recorded the highest number of seeds/pod (7.93) followed by HGS 100 (7.65), and least by HG 563 (C) (6.29). Difference between row to row spacing and fertility levels was non-significant with respect to number of seeds/pod. However, Deshmukh *et al.* (2014) reported increase in number of pods per cluster with the application of RDF.

Grain Yield and 100-Seed Weight

Data (Table 1) revealed that genotype HGS 8-1 recorded the highest grain yield (8.85 q/ha) of guar crop closely followed by HGS 100 (8.78 q/ha) and lowest by HG 563 (C) (7.17 q/ha). Data further indicated that row to row spacing had non-significant effect on the grain yield of guar. Application of 20 kg N+40 kg P_2O_5 /ha significantly increased the grain yield from 7.38 to 9.15 q/ha over 10 kg N+20 kg P_2O_5 /ha. Reddy and Reddy (2011) also reported the increase in seed yield of guar with the application of recommended dose of nitrogen.

Data (Table 1) regarding 100-seed weight indicated that genotype HGS 8-1 recorded the highest 100-seed weight (3.35 g) of clusterbean crop closely followed by HGS 100 (3.16 g) then by HG 563 (C) (3.08 g). Like pod length, 100-seed weight slightly increased with increase in row spacing and fertility levels but the differences were statistically non-significant.

Crude Protein and Gum Content

Data (Table 1) revealed that highest content of crude protein in clusterbean seed (29.57%) was recorded by genotype HG 563 (C) followed by HGS 8-1 (28.73%) and closely followed by HG100 (28.71%). Crude protein significantly increased from 28.61 to 29.40 per cent with the increase in row to row spacing from 30 to 45 cm. Application of 20 kg N+40 kg P_2O_5/ha significantly increased protein content in clusterbean seed from 28.62 to 29.35 per cent over 10 kg N+20 kg P_2O_5/ha. Ayub *et al.* (2010) and Ayub *et al.* (2011) also reported the increase in crude protein in guar with application of nitrogen.

Data (Table 1) revealed that genotype HGS 8-1 recorded the maximum gum content (32.52%) in cluster-bean seed closely followed by HGS 100 (30.98%) then by HG 563 (C) (30.31%). With the increase in row to row spacing from 30 to 45 cm, gum content increased

TABLE 1

Effect of row spacings and fertility levels on the yield, yield attributes and quality of promising genotypes of clusterbean

Treatment	Yield attributing characters				Grain yield (q/ha)	Gum (%)	Crude protein (%)
	Pods/plant	Seeds/pod	Pod length (cm)	100-seed weight (g)			
Genotypes							
HGS 100	48.65	7.65	5.14	3.16	8.78	30.98	28.71
HGS 8-1	46.50	7.93	5.25	3.35	8.85	32.52	28.73
HG 563 (C)	40.17	6.29	4.98	3.08	7.17	30.61	29.57
C. D. (P=0.05)	2.55	0.46	NS	0.14	0.92	0.29	0.32
Row spacing (cm)							
30	44.86	7.23	5.06	3.14	7.83	30.97	28.61
45	45.34	7.49	5.18	3.25	8.70	31.76	29.40
C. D. (P=0.05)	NS	NS	NS	NS	NS	0.20	0.25
Fertility levels							
10 kg N+20 kg P_2O_5	40.36	7.28	5.07	3.16	7.38	30.67	28.62
20 kg N+40 kg P_2O_5	49.84	7.44	5.17	3.23	9.15	32.07	29.35
C. D. (P=0.05)	2.49	NS	NS	NS	0.88	0.20	025

NS–Not Significant.

significantly from 30.97 to 31.76 per cent. Application of 20 kg N+40 kg P_2O_5/ha significantly increased gum content from 30.67 to 32.07 per cent over 10 kg N+20 kg P_2O_5/ha.

CONCLUSION

Genotype HGS-100 performed better in case of pods/plant. Genotype HGS 8-1 was found superior over all other genotypes with respect to seeds/pod, pod length, 100-seed weight, grain yield and gum content in cluster- bean seed. Genotype HG 563 (C) recorded the highest crude protein. Application of 20 kg N+40 kg P_2O_5/ha significantly increased the pods/plant, grain yield of clusterbean, gum and protein content.

REFERENCES

Akter, S., A. T. M. Farid, N. C. Shil, and M. Rahman. 1998 : Effect of different fertilizers on nodulation and yield of cowpea. *Legume Res.*, **21** : 74-78.

Ayub, M., M. Khalid, M. Tariq, M. A. Nadeem, and M. Nadeem . 2011 : Effect of different seeding densities and nitrogen levels on growth, forage yield and quality attributes of clusterbean [*Cyamoposis tetragonoloba* (L.) Taub.]. *J. Agric. Technol.*, **7** : 1409-1416.

Ayub, M., M. Tahir, M. A. Nadeen, M. A. Zubair, M. Tariq, and M. Ibrahim. 2010 : Effect of nitrogen application on growth, forage yield and quality of three clusterbean varieties. *Pak. J. Life & Social Sci.*, **8** : 111-116.

Baboo, R., and S. K. Mishra. 2001 : Growth and pod production of cowpea (*Vigna sinensis* Savi.) as influenced by inoculation, nitrogen and phosphorus. *Ann. Agric. Res.*, **22** : 104-106.

Balbhim, L. Chavan, Mangesh, M. Vedpathak and R. Bhimashankar. 2015 : Effects of organic and chemical fertilizers on clusterbean (*Cyamopsis tetragonoloba* L.). *European J. Exptl. Biol.*, **5** : 34-38. ISSN : 2248-9215.

Deshmukh, R. P., P. K. Nagre, A. P. Wagh, and V. N. Dod. 2014 : Effect of different bio-fertilizers on growth, yield and quality of clusterbean. *Ind. J. Adv. Plant Res. (IJAPR)*, **24** : 39-42.

Marton, L., and I. Kadar. 1998 : Effect of nitrogen supplies on yield components of soya. A nitrogenellats hatasa a szoja terneselemeire. *Novenytermeles*, **47** : 677-687.

Osborne, S. L., and W. E. Riedell. 2006 : Starter nitrogen fertilizer impact on soybean yield and quality in Northern Great Plains. *Agron. J.*, **98** : 1569-1574.

Reddy, A. M., and B. S. Reddy. 2011 : Effect of planting geometry and fertility level on growth and seed yield of clusterbean [*Cyamopsis tetragonoloba* (L.) Taub.] under scarce rainfall zone of Andhra Pradesh. *Legume Res.*, **34** : 143-145.

Sewhag, M., I. S. Hooda, A. S. Dhindwal and Suresh Kumar. 2011 : Influence of bed planting method on soil physico-chemical properties under varying moisture regimes in clusterbean–wheat crop sequence. *Har. J. Agron.* **27** : 26-28.