RESEARCH ARTICLE

STUDY OF DIFFERENT GENOTYPE, PLANTING GEOMETRY AND NUTRIENT STATUS IN PIGEON PEA DURING RABI SEASON

B. Tigga, S. Bhagat, D.K. Chandrakar, Akhilesh K. Lakra* and T. R. Banjara

Department of Agronomy, College of Agriculture, IGKV, Raipur (Chhattisgarh)
E-mail Author: biruamb15@gmail.com

Received-21.02.2017, Revised-15.03.2017

Abstract: A field experiment was conducted during winter season of to study the performance of pigeonpea genotypes to planting geometry. The genotype and planting geometry significantly influenced the seed yield, stalk yield, harvest index, availability of nutrient in soil, nutrient % in seed and Stover. Among the six genotypes (Asha, Rajeevlochan, RPS- 2007-106, Laxmi, RPS-2008-4 and RPS-2007-10) tested, genotype Asha (1281 kg ha^{-1}) recorded significantly highest seed yield over the other genotype. In the two planting geometry significantly maximum seed yield of 1235 kg ha^{-1} was realized with spacing of 45 cm x 10 cm and was higher yield than the yield recorded with spacing of 60 cm x 10 cm (1085 kg ha^{-1}). In genotype Asha (227.722 kg ha^{-1}) availability of nitrogen and nutrient (NPK) % of seed and Stover are significance. In narrow spacing significantly maximum availability of nitrogen and nutrient (NPK) % of seed and Stover was significance over the wild spacing.

Keyword: Genotype, Geometric, Nutrient, Energy, Seed and Plant

INTRODUCTION

Pigeonpea (*Cajanus cajan* L.) is important component as it belong to leguminous family which enriches the soil by adding nitrogen, reduce soil erosion, improve physic-chemical properties of the soil. Thus, there is an urgent need to increase the production of pulses to meet the increasing demand by manipulating the production technologies appropriately. Pigeonpea is the second most important pulse crop of India after chickpea. It has been realized that not only chemical fertilizers but also organic manures will sustain and maintain the productivity. Pigeonpea with a broad inter row and plant spacing will provide good scope for incorporation of organic manure in the seed line itself so that the efficiency of the manure will be increased many folds. Since, the information on the optimum plant density is urgently needed with special reference to nutrient removal, irrigation requirement and their effect on growth of pigeonpea. This will be attained at an optimum plant density, which not only utilizes light, moisture and nutrients more efficiently but also avoids excessive competition among the plants. Based on climatic conditions, researchers obtained differential response of mash bean in relation to row spacing. Results obtained by Davi *et al.* (1995) deciphered that grain yield was highest at 15 cm intra-row spacing. Whereas, Nagaraju *et al.* (1995) revealed that seed yield decreased with an increase in row spacing. Kumar *et al*. (1997) obtained. The highest seed yield with row spacing of 15 cm (1.09 t ha^{-1}). However, Mishra and Mishra (1995) concluded that seed yield was not affected by row spacing.

*Corresponding Author

MATERIAL AND METHOD

A field experiment was carried out during the winter season at the Instructional Cum Research Farm, I.G.K.V.,Raipur (C.G.). Experiment was laid out in factorial randomized block design with three replications. The treatment consisted of six genotypes viz. – Asha, Rajeev lochan, Laxmi, RPS-2008-4, RPS-2007-10 and RPS- 2007-106 as factor one and two planting geometry viz. 60 cm x 10 cm and 45 cm x 10 cm as factor two. Crop was fertilizes @ 20:50:20:20 kg $N:P_2O_5:K_2O:S$. Stomp 30 EC (*Pendimethalin*) was applied @ 2.5 lit ha^{-1} as pre-emergence to control the weeds followed by two hand weeding at 40 and 65 DAS. Two spray of Curacron 10 % (*Profenophos*) 1 lit ha^{-1} $spray^{-1}$ was done at 50 and 80 DAS as plant protection measures. The crop was given total four irrigations.

RESULT AND DISCURSION

It is quite clear from table that genotype Asha (V_1) recorded significantly higher seed yield (1281.42 kg ha^{-1}) and Stover yield (5887.50 kg ha^{-1}) over other genotypes of pigeonpea tested in the experiment. It was statistically comparable with Rajeevlochan (V_2), Laxmi (V_3) and RPS 2007-106 (V_6). Asha recorded 18.03 %, 19.31% and 28.89 %, 30.86% higher seed yield and Stover yield than RPS-2007-10 and RPS-2008-4, respectively. This might be due to higher number of pods $plant^{-1}$, more number of seeds pod^{-1}, number of seeds $plant^{-1}$, higher 100-seed weight and growth characters *viz*. plant height, branches, LAI, dry matter accumulation resulting into higher seed yield and Stover yield in Asha (V_1) genotype. Each genotypes has their own yield potential which expressed in shape of plant growth and ultimately to seed yield. Similar findings have also been reported

by Goswami *et al*. (1998). Genetic differences for seed yield have also been reported by Kashyap *et al.* (2003), Umesh *et al.* (2013).

Table 1. Seed yield, stalk yield and harvest index as influenced by pigeon pea genotypes and planting geometry

Treatment	Seed yield (kg ha^{-1})	Stalk yield (kg ha^{-1})	Harvest Index (%)
Genotype			
Asha	1281.42	5887.50	18.14
Rajeev lochan	1268.48	5784.17	18.32
Laxmi	1220.10	5578.82	18.33
RPS-2008-4	911.27	4070.48	18.33
RPS-2007-10	1050.38	4750.33	18.30
RPS- 2007-106	1226.47	5596.93	18.21
SEm±	**63.4**	**295.4**	**0.09**
CD (P=0.05)	**185.9**	**866.5**	**NS**
Planting geometry			
S_1 : 45 cm x 10 cm	1234.80	6172.72	16.67
S_2 : 60 cm x 10 cm	1084.60	4383.35	19.87

Harvest index is a measure of physiological productivity potential of crop genotypes. It is the ability of a plant to convert the dry matter into economic yield. The difference in harvest index (%) due to genotypes was found non-significant.

In two spacing treatments, the crop planted with row spacing of 45 cm and plant to plant 10 cm (S_2) recorded significantly higher grain yield (1234.80 kg ha^{-1}) and Stover yield (6172.72 kg ha^{-1}) over wider row spacing 60 cm x 10 cm. narrow planting of pigeonpea (45 cm x 10 cm) recorded 12.16 % more yield over wider row spacing of 60 cm x 15 cm (S_2). However, in terms of seed yield and Stover yield narrow spacing was statistically found superior over wider spacing might be due to the fact that total number of plants (2.22 lakh plants ha^{-1}) per unit area was higher over wider spacing and this higher number of plants per unit area neutralized the effect of vegetative and reproductive parameter registered in wider spaced crops. Optimum plant population is a pre-requisite for obtaining high yields (Nandan and Kumar 2005). The results are in accordance with the findings of Panwar and Sirohi (1987). Significantly maximum value of harvest index (19.87 %) was recorded under 60 cm x 10 cm (S_2) planting geometry, over narrow planting geometry of 45 cm x 10 cm (16.67) Similar results were recorded by Asaduzzaman *et al.* (2010).

Table 2. Available nutrient (kg ha^{-1}) in soil as influenced by pigeonpea genotypes & planting geometry

Treatment	Available nutrient (kg ha^{-1})		
	N	**P**	**K**
Genotype			
Asha	227.722	18.050	329.413
Rajeev lochan	224.720	17.967	327.373
Laxmi	226.722	18.917	326.523
RPS-2008-4	218.760	16.883	323.350

RPS-2007-10	223.172	17.870	325.418
RPS- 2007-106	227.925	18.350	329.750
SEm±	**1.916**	**0.430**	**1.506**
CD (P=0.05)	**5.620**	**NS**	**NS**
Planting geometry			
S_1 : 45 cm x 10 cm	226.569	18.217	327.749
S_2 : 60 cm x 10 cm	223.104	17.796	326.193
SEm±	**1.106**	**0.248**	**0.870**
CD (P=0.05)	**3.245**	**NS**	**NS**

Table 3. N, P and K content in grain and Stover (%) as influenced by pigeonpea genotypes and planting geometry

Treatment	**N content (%)**		**P content (%)**		**K content (%)**	
	Seed	**Stover**	**Seed**	**Stover**	**Seed**	**Stover**
Genotype						
Asha	3.525	0.837	0.302	0.100	0.580	1.118
Rajeev lochan	3.413	0.807	0.280	0.097	0.560	0.957
Laxmi	3.337	0.708	0.268	0.079	0.513	0.852
RPS-2008-4	3.207	0.592	0.263	0.064	0.480	0.830
RPS-2007-10	3.287	0.622	0.273	0.070	0.498	0.915
RPS- 2007-106	3.400	0.802	0.290	0.095	0.538	0.930
SEm±	**0.066**	**0.041**	**0.008**	**0.005**	**0.016**	**0.043**
CD (P=0.05)	**0.195**	**0.121**	**0.022**	**0.016**	**0.047**	**0.127**
Planting geometry						
S_1 : 45 cm x 10 cm	3.423	0.766	0.288	0.090	0.542	0.972
S_2 : 60 cm x 10 cm	3.300	0.690	0.271	0.078	0.514	0.896
SEm±	**0.038**	**0.024**	**0.004**	**0.003**	**0.009**	**0.025**
CD (P=0.05)	**0.112**	**0.070**	**0.013**	**0.009**	**0.027**	**0.074**
Interaction	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Genotypes differed significantly with respect to available nitrogen in soil. Asha recorded significantly higher available nitrogen in soil (227.722 kg ha^{-1}) than comparable with other genotype in soil. But the phosphors and potash are non significance in different genotype. It is quite clear from table that genotype Asha (V_1) recorded significantly higher availability nitrogen, phosphorus and potash present in seed (3.52, 0.30 and 0.58 %) and stover (0.83, 0.10 and 1.11 %) over other genotypes of pigeonpea tested in the experiment. It was statistically comparable with Rajeev lochan (V_2), Laxmi (V_3) and RPS 2007-106 (V_6). Similar findings have also been reported by Subbalah and Sudhakar Rao (1998).

In two spacing treatments, the crop planted with row spacing of 45 cm and plant to plant 10 cm (S_2) recorded significantly higher availability nitrogen, phosphorus and potash present in seed (3.42, 0.28 and 0.54 %) and Stover (0.76, 0.09 and 0.97 %) over wider row spacing 60 cm x 10 cm. Similar findings have also been reported by Subbalah and Sudhakar Rao (1998).

REFERENCES

Asaduzzaman, M., Sultana, S., Roy, T.S. and Masum, S.M. (2010).Weeding and pant spacing effects on the growth and yield of black gram. *Bangladesh Research Publications Journal* **4(1):**62-68.

Davi, D., Kumar,R. and Khippal,A. (1995).Effect of different intra-row spacing on the growth of pigeon pea and urdbean intercropping. *Discovery and Innovation*, **9(1-2):** 47-51.

Goswami, J.,Borah, U.K. and Deka, N. (1998). Performance of blackgram (*Phaseolus mungo* L.) varieties under different row spacing. *Haryana Journal of Agronomy* **14(1):** 44-47.

Kashyap, T.L.,Shrivastava, G.K., Lakpale, R. and Choubey, N.K. (2003). Productivity potential of pigeonpea (*Cajanus cajan L. Millsp*) genotypes in response to growth regulators under Vertisols of Chhattisgarh plains. *Annals of Agril. Research*, **24(2):** 449-452.

Kumar, S.G., Gomathinayajam,P.andRathnaswmy,R.(1997).Effect of row spacing on a dry matter accumulation of black gram. *Madras Agric. J.*, 84(3): 160-162.

Mishra, M.and A.Mishra. (1995).Effect of fertilizers, weed control and row spacing on summer black gram (*Phaseolus mungo*). *Indian J. Agron*, **40(3):** 434-438.

Nagaraju, A.P., Shivanandah,N.P. and Shambulingappa,K.G.(1995). Response of urdbean genotype to row spacing. *Indian J. Pulses Res.*, **8(2):** 190-191.

Nandan, R. and Kumar, D. (2005).Response of mungbean genotypes to varying plant populations. *Indian Journal of Pulses Research* **18(1):** 81-83.

Panwar, J.D.S. and Sirohi,G.S.(1987).Studies on effect of plant population on grain yield and its components on mungbean (*Vigna radiate* L.). *Ind. J. Plant Physiol.* **30(4):** 412-415.

Subbalah and Sudhakar Rao.P.S.S. (1998).Effect of varying levels of phosphorus and nitrogen in combination with rhizobium on post rainy season pigeonpea [*Cajanus Cajan* (L.) Millsp.]. *Andhra Agric J.*, **45**:61-64.

Umesh, M.R., Shankar,M.A. and Ananda, N. (2013). Yield, nutrient uptake and economics of pigeonpea (*Cajanus cajan L.*) genotypes under nutrient supply levels in dryland Alfisols of Karnataka. *Indian J. of Agronomy*, **58(4):** 554-559.