General Impact Factor (GIF): 0.875
Scientific Journal Impact Factor: 1.205

e- ISSN: 2394-5532
p- ISSN: 2394-823X

International Journal of Applied And Pure Science and Agriculture

www.ijapsa.com

STUDIES ON SEASONAL AND GEOMETRICAL VARIATIONS IN GROWTH ATTRIBUTES AND YIELD OF BLACKGRAM (*Vigna mungo* (L.) Hepper)

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ABSTRACT

Field experiments were conducted during 2012-13 rabi and summer seasons at Tamil Nadu Agricultural University, Coimbatore to assess the seasonal and geo-metrical variations in pre-release blackgram genotypes/variety under gardenland and rice fallow condition. Blackgram variety Co BG 6 at a planting geometry of 30 x 10 cm proved to be a better agronomic option for getting higher grain yield of (1046 kg ha $^{-1}$ in rabi and 746 kg ha $^{-1}$ in summer), followed by Co BG 759 genotype at 20 x 20 cm crop geometry recording (940 kg ha $^{-1}$ in rabi and 637 kg ha $^{-1}$ in summer), higher yield at Coimbatore, located in western zone of Tamil Nadu.

Keywords: Blackgram, crop geometry, genotypes, variety, yield.

I. Introduction

Pulses are the major source of dietary protein in the vegetarian diet of our country. Nutritionally, pulses are two to three times richer in protein than the cereal grains and have remained the least expensive source of protein for the human diet. These crops also serve as nutritive fodder and maintain soil fertility through biological nitrogen fixation and thus, play a vital role in strengthening sustainable agriculture (Kannaiyan, 1999). Generally, pulses are grown on marginal soils, as mono and intercrop during *rabi* and summer seasons.

Blackgram, the most prominent cultivated pulse crop, holds potential to increase pulse production in the country, nearly occupying 8 per cent of the total pulse area and is the third most important pulse crop of India in terms of acreage and production next to bengalgram and pigeon pea. Indian production of pulses is around 14.76 million tonnes from an area of 23.63 million hectares. The area under blackgram in India is 3.80 million hectares with an annual production of 1.1 million tonnes. In Tamil Nadu, the area under blackgram is 3.41 lakh hectares with an annual production of 1.21 lakh tonnes (DES, 2011). In Tamil Nadu the low productivity of blackgram is due to improper management practices. Use of improved crop management packages can invariably increase the productivity by 50-100 per cent. In addition to other management practices such as irrigation and plant protection, blackgram responds markedly to plant population level.

The blackgram varieties grown at present are longer in duration, non-specific in habitation with wide difference on specific/various seasons and eco systems and with the advent of determinate short duration genotypes, it is possible to mechanize blackgram production. Since these genotypes are shorter in stature, their population levels are to be redefined and the appropriate crop geometry is to be identified. Sowing at appropriate time and maintaining optimum population are considered to be the most important factor for increasing the pulse yield under rain fed condition (Paulpandi *et al.*, 2002). Ahuja (1984) reported different plant spacing for achieving higher yield under different set of conditions. Manipulation of crop geometry appears to have a promising potential for increasing the blackgram yield.

II. Materials and methods

Field experiments were conducted during 2012-13 *rabi* and *summer* seasons in agronomic experimental field at Tamil Nadu Agricultural University, Coimbatore to studies on seasonal and geometrical variations in growth attributes and yield of blackgram. The location of the farm is North Western Agro – Climatic zone of Tamil Nadu situated at 11° N latitude and 77° E longitude with an altitude of 426.7 m above MSL.

The experiments were laid out in split plot design with three replications. The experiments comprised of twenty treatments with five treatments in main plot *viz.*, planting geometry S_1 - 30 x 10 cm, S_2 - 30 x 30 cm, S_3 - 20 x 10 cm, S_4 - 25 x 10 cm, S_5 - 20 x 20 cm. The sub plot were genotypes/varieties V_1 - Co BG 6, V_2 - Co BG - 759, V_3 - Co BG - 10-5, V_4 - Co BG - 11-2 with uniform recommended dose of fertilizers at 25:50:25 kg ha^{-1} N, P and K. Growth components, grain and haulm yield were recorded at harvest stage.

III. Results and discussions

Growth attributes

The LAI, CGR, and DMP of blackgram were significantly higher at 30 x 10 cm planting geometry than at 20 x 10 cm, 25 x 10 cm, 20 x 20 cm and 30 x 30 cm respectively. The (Table1and 2) clearly indicates that leaf area index (4.75, 4.59), crop growth rate (2.55, 1.97 g m^{-2} day^{-1}), dry matter production (2625, 2144 kg ha^{-1}) as a measure of vegetative growth of plants and the assimilatory surface on which the production of dry matter takes place. The growth parameters observed and recorded were similar in both *rabi* and *summer* seasons.

Higher numbers of plants were accommodated under 30 x 10 cm plant geometry and this could have resulted in higher LAI, CGR, and DMP. This is in conformity with the findings of Sathyamoorthi *et al.*, (2008) in greengram and Cheghakhor *et al.*, (2009) in chick pea. Among variety/genotypes Co BG 6 gave higher leaf area index, crop growth rate, dry matter production compared to other genotypes like Co BG 759, Co BG 10-5, Co BG 11-2.

Grain and haulm yield

The (Table 3) maximum grain yield was recorded with planting geometry of 30 x 10 cm in variety Co BG 6 (1046 and 746 kg ha^{-1}) followed by the genotype Co BG 759 with 20 x 20 cm (940 and 637 kg ha^{-1}), haulm yield of (1938 and 1917 kg ha^{-1}) increased yield at closer planting geometry which might be due to better crop growth rate and lesser competition for resources between lands which led to increase in yield components. The yield observed at recorded were similar in both *rabi* and *summer* seasons. Similar findings were also reported by Tomar (1991) in greengram and blackgram. Bhairappanavar *et al.*, (2005) in blackgram and Siddaraju *et al.*, (2010) in cluster bean.

Conclusion

The study on seasonal and geometrical variations in Blackgram indicated that adopting closer planting geometry of 30cm x 10cm in variety Co BG 6 realized better yield 1046 and 746 kg ha^{-1} of grain yield Blackgram in both *Rabi* and *Summer* seasons.

Bibliography

[1] Ahuja, K.N.1984. Response of pigeon pea to plant density and phosphate fertilization. Indian J.Agron., 29 (2): 528-532.

[2] Bhairappanavar S.T., H.M. Jayadeva, T.H. Gowda and S. Shivanna. 2005. Effect of nutrients and spacing on the yield of urdbean under late sown condition. Legume Res., 28 (1): 46-48.

[3] Cheghakhor A.Y, M. Meskararbashee, R. Mamaghan, and M. Nabipour. 2009. Effect of row spacing and plant density on radiation use efficiency and extinction light coefficient on canopy of chick pea cultivars. Res. Crops, 10 (3): 545-554
[4] DES, 2011. Per capita net availability of food grains (per day) in India, Directorate of Economics and Statistics, Department of Agriculture and Co-operation.
[5] Kannaiyan, S. 1999. Bioresource technology for sustainable agriculture. Associate Publishing Company. New Delhi. 422.
[6] Paulpandi, V.K., U. Solaiappan, S. Senthilvel, N. Chelliah and R. Balasubramanian. 2002. Effect of sowing dates and planting geometry on yield of redgram in rainfed vertisols. Madras Agric. J., 89 (10-12): 622-625.
[7] Sathyamoorthi, K., M. Mohammed Amanullah, K. Vaiyapuri and E. Somasundaram. 2008. Influence of increased plant density and nutrient management on growth rate and yield of greengram (*Vigna radiata* (L.) wilczek). Int J. Plt. Sci., 3 (2): 628-632.
[8] Siddaraju, R., S. Narayanaswamy, Ramegowda and S. Rajendra Prasad. 2010. Studies on growth, seed yield and yield attributes as influenced by varieties and row spacing in cluster bean (*Cyamopsis tetragonoloba* L.). Mysore J. Agric. Sci., 44 (1): 16-21.
[9] Tomar, S.S. and A.S.Tiwari. 1991. Effect of plant density on genotypes of greengram and blackgram. Indian J. Agric. Sci., 61: 126-127.

Table 1 .Effect of crop geometry and variety/ genotypes on leaf area index and dry matter production in blackgram – *Rabi and Summer* at harvest stage.

Treatments	Leaf area index											
	Rabi						*Summer*					
	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean
V_1	4.75	2.24	2.53	4.17	4.11	**3.56**	4.59	2.06	2.38	4.02	3.96	**3.40**
V_2	3.70	1.19	3.19	3.14	3.63	**2.97**	3.51	1.03	3.03	3.01	3.46	**2.81**
V_3	3.13	1.71	2.98	3.70	2.66	**2.84**	2.97	1.54	2.81	3.52	2.47	**2.66**
V_4	2.83	0.69	1.91	2.89	3.38	**2.34**	2.70	0.51	1.73	2.76	3.22	**2.18**
Mean	**3.60**	**1.46**	**2.65**	**3.48**	**3.45**	2.92	**3.44**	**1.29**	**2.49**	**3.33**	**3.28**	2.76
	SEd			**CD (P=0.05)**			**SEd**			**CD (P=0.05)**		
S	0.078			0.216			0.088			0.244		
V	0.078			NS			0.041			NS		
S at V	0.144			NS			0.108			NS		
V at S	0.136			NS			0.071			NS		

Dry matter production (DMP) (kg ha^{-1})												
	Rabi						*Summer*					
Treatments	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean
V_1	2625	1284	1851	2217	2175	**2030**	2144	1259	1620	1870	1842	**1747**
V_2	2415	1259	2132	1974	2126	**1981**	2015	1225	1814	1693	1812	**1712**
V_3	2441	1313	1901	1890	2018	**1912**	2018	1270	1663	1664	1749	**1673**
V_4	2312	1274	1797	1692	2178	**1850**	1914	1246	1602	1509	1847	**1624**
Mean	**244**	**1282**	**1920**	**194**	**212**	1943	**2023**	**125**	**167**	**168**	**181**	1689

	8			3	4			0	5	4	3	
	SEd						CD (P=0.05)					
S	26.87			76.60			41.1			114.18		
V	30.36			62.68			8.5			17.5		
S at V	54.18			NS			43.2			NS		
V at S	52.60			NS			14.7			NS		

Table 2. Effect of crop geometry and variety/ genotypes on crop growth rate (CGR) (g $m^{-2}day^{-1}$) in blackgram - *Rabi and Summer*.

Treatments	Crop growth rate (CGR)											
	Rabi						*Summer*					
	S_1	S_2	S_3	S_4	S_5	Mean	S_1	S_2	S_3	S_4	S_5	Mean
V_1	2.55	2.30	1.43	1.37	1.81	**1.89**	1.97	2.87	0.16	0.45	0.23	**0.08**
V_2	1.89	2.51	1.25	1.75	1.64	**1.81**	1.30	3.15	0.72	0.16	0.05	**0.47**
V_3	1.61	2.63	1.67	1.52	1.32	**1.75**	1.03	3.24	1.26	0.07	0.65	**0.84**
V_4	1.11	3.05	1.35	1.22	1.35	**1.62**	0.20	3.64	1.60	0.51	1.28	**1.37**
Mean	**2.62**	**1.79**	**1.42**	**1.46**	**1.53**	**1.76**	**1.12**	**1.12**	**0.93**	**0.01**	**0.41**	**0.79**
	SEd			**CD (P=0.05)**			**SEd**			**CD (P=0.05)**		
S	0.232			NS			0.155			NS		
V	0.113			0.233			0.036			0.075		
S at V	0.290			NS			0.165			NS		
V at S	0.195			NS			0.063			NS		

Table.3. Effect of crop geometry and variety/ genotypes on Grain and haulm yield (kg ha^{-1}) in blackgram - *Rabi and Summer*

	Rabi						*Summer*					
Grain yield (Kg ha^{-1})												
Treatments	**S_1**	**S_2**	**S_3**	**S_4**	**S_5**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**S_5**	**Mean**
V_1	1046	880	910	885	947	**934**	746	582	649	613	589	**629**
V_2	948	808	860	878	940	**887**	596	578	602	581	637	**598**
V_3	958	833	881	914	878	**893**	640	512	652	566	586	**591**
V_4	902	780	897	949	898	**885**	655	529	564	579	604	**586**
Mean	**963**	**825**	**887**	**906**	**916**	**900**	**659**	**550**	**564**	**584**	**604**	**601**
	SEd						**CD (P=0.05)**					
S	15.79			36.41			7.49			20.79		
V	21.35			44.06			14.79			30.21		
S at V	33.91			71.17			33.91			71.17		
V at S	36.98			76.32			36.97			76.32		

	Rabi						*Summer*					
Haulm yield (Kg ha^{-1})												
Treatments	**S_1**	**S_2**	**S_3**	**S_4**	**S_5**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**S_5**	**Mean**
V_1	1938	1890	1911	1968	1942	**1930**	1917	1535	1658	1730	1742	**1716**
V_2	1931	1885	1908	1900	1925	**1910**	1876	1513	1731	1729	1712	**1712**
V_3	1928	1892	1911	1922	1919	**1914**	1885	1485	1734	1722	1752	**1716**
V_4	1931	1894	1928	1918	1927	**1920**	1850	1482	1704	1709	1745	**1698**
Mean	**1932**	**1890**	**1915**	**1927**	**1928**	**1918**	**1882**	**1504**	**1707**	**1722**	**1738**	**1710**
	SEd						**CD (P=0.05)**					
S	48			110			46			129		
V	51			NS			21			NS		
S at V	87			NS			57			NS		
V at S	75			NS			36			NS		