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Effect of Spacings on Growth and Yield of Pigeonpea

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ABSTRACT

A field experiment was conducted at S.V. Agricultural College wetland farm, Tirupati, to study the performance of pigeonpea genotypes under varied spacings in Southern Agro-climatic Zone of Andhra Pradesh during *rabi* 2010. The treatments consisted of combination of two factors *viz.,* four varieties (LRG-41, TRG-7, TRG-22 and ICPL-85063) and three spacings (45x15 cm-1,48,148 plants ha^{-1}, 60x15 cm-1,111,11 plants ha^{-1} and 75x15 cm-88,888 plants ha^{-1}). The variety ICPL-85063 at spacing of 45x15 cm recorded the higher growth parameters, yield attributes and yield. The present study has revealed that the variety ICPL-85063 spaced at closer spacing of 45x15 (1,48,148 plants ha^{-1}) cm resulted in higher seed yield and economic returns followed by TRG-22 and LRG-41 at same row spacing.

Key words : Pigeonpea, Spacings,Varieties.

Pulses form an important constituent of Indian diet not only because of their high protein content but also due to the fact that pulse protein contains the essential amino acid “lysine” which is deficient in cereals. Pigeonpea is popularly called as arhar or tur and is used as food, fodder and fuel. It plays an important role in sustaining soil productivity by fixing atmospheric nitrogen. The fallen leaves of pigeonpea enrich the soil with organic matter and help in maintaining soil fertility.

Among the pulse crops grown in India, pigeonpea is the second important crop cultivated over an area of 3.37 million hectares with an annual production of 2.26 million tonnes with a productivity of 871 kg ha^{-1}. In Andhra Pradesh during the year 2010 it was grown over an area of 4.63 lakh hectares with an annual production of 2.03 lakh tonnes with a productivity of 438 kg ha^{-1}.

For obtaining higher seed yield, suitable spacing should be maintained. Influence of spacing on seed yield of redgram has been observed by many researchers. The optimum plant population per unit area is an important non monetary input to decide the maximum productivity of the crop.

The lower yields of pigeonpea are attributed to the non availability of improved cultivars that are sensitive to the pests and diseases with a change in climate for a short period, in addition to the crop and land management practices. Among the different agronomic practices, date of sowing, row spacing (crop geometry) and plant population for a particular cultivar and crop management practices plays an important role in determining the yield in pigeonpea. In this context, it was planned to evaluate the influence of different row spacings on various pigeonpea varieties.

MATERIAL AND METHODS

A field experiment was conducted during *rabi,* 2010-11 at S.V. Agricultural College wetland farm, Tirupati Campus of Acharya N.G. Ranga Agricultural University, Andhra Pradesh to study the “Performance of pigeonpea genotypes under varied spacings during *rabi* in Southern Agro-climatic Zone of Andhra Pradesh”. The experiment was laid out in a randomized block design with factorial concept, replicated thrice. The treatments consisted of combination of two factors, four varieties (LRG-41, TRG-7, TRG-22 and ICPL-85063) and three spacings (45x15 cm-1,48,148 plants ha^{-1}, 60x15 cm-1,111,11 plants ha^{-1} and 75x15 cm-88,888 plants ha^{-1}). The soil of the experimental field was sandy loam in texture with pH 8.8 and 0.22% organic carbon. The available nitrogen, phosphorus and potassium were 186.4 kg ha^{-1}, 25.8 kg ha^{-1} and 183.6 kg ha^{-1} respectively.

All the management practices were adopted for pigeonpea cultivation as per the recommendations of Acharya N.G. Ranga Agricultural University, A.P. The data recorded on various parameters of crop was subjected to statistical scrutiny by the method of analysis of variance as outlined by Panse and Sukhatme (1985).

Table 1. Growth parameters of pigeonpea varieties at harvest as influenced by different spacings.

Treatment	Plant height (cm)	Leaf area index (LAI)	Dry Matter Production (kg ha^{-1})
Varieties			
LRG-41	128.6	1.02	5744.00
TRG-7	125.9	0.79	4256.00
TRG-22	131.9	1.16	6129.00
ICPL-85063	134.2	1.23	7485.00
SEm±	2.3	0.06	110.40
CD (P=0.05)	4.7	0.12	222.00
Spacings			
45 x 15 cm (1,48,148 plants ha^{-1})	133.8	1.21	7026.00
60 x 15 cm(1,11,111 plants ha^{-1})	129.2	1.01	5748.00
75 x 15 cm (88,888 plants ha^{-1})	127.4	0.92	4938.00
SEm±	2.0	0.05	95.60
CD (P=0.05)	4.1	0.11	192.00
Interaction			
SEm±	4.0	0.11	191.20
CD (P=0.05)	NS	NS	NS

RESULTS AND DISCUSSION

Pigeonpea varieties and spacings differed significantly in plant height, Leaf Area Index and dry matter production at harvest (Table 1). ICPL-85063 variety recorded the highest plant height, Leaf Area Index and dry matter production at 45x15 cm row spacing while the lowest plant height, Leaf Area Index and dry matter production were observed with variety TRG-7 at 75x15 cm (wider spacing). The interaction was not significant between varieties and spacing with regard to plant height, Leaf Area Index and dry matter production at harvest. Mutual shading of the plants under close spacing, increased competition for light might be the cause for plants. Similar findings were reported by Singh *et al.* (1994), Nagamani *et al.* (1995) and Mahajan *et al.* (1997). Higher Leaf Area Index of ICPL-85063 and delayed senescence of leaves helped this variety to produce more photosynthates which ultimately led for more seed yield. These results regard to dry matter production were in consonance with the findings of Rajendra sahu (1994) and Nagamani *et al.* (1995).

The more number of pod bearing branches plant^{-1}, number of pods plant^{-1}, number of seeds pod^{-1}, and pod length were noticed with the variety ICPL-85063 at closer spacing while the lower yield attributes were recorded with variety TRG-7 at 75x15 cm spacing. Higher and lower test weight was recorded by the varieties ICPL-85063 and TRG-7 respectively. These results were in line with the findings of Lakshminarayana (2003) and Siag *et al.* (1993). Pigeonpea varieties and different row spacings significantly altered the yield attributes *viz.,* number of pod bearing branches plant^{-1}, number of pods plant^{-1}, number of seeds pod^{-1} and pod length. The test weight was not influenced by different spacings (Table 2).

Pigeonpea varieties and different spacings differed significantly in seed yield and stalk yield (Table 2). The higher seed and stalk yields were recorded by the variety ICPL-85063 at 45x15 cm

Table 2. Yield attributes and Yield of pigeonpea varieties as influenced by different Spacings

Treatment	No.of pod bearing branches plant^{-1}	No.of pods branch^{-1}	No.of seeds pod^{-1}	Pod length (cm)	Test weight (g)	Seed yield (kg ha^{-1})	Stalk yield (kg ha^{-1})
Varieties							
LRG-41	14.6	23.7	3.8	4.8	11.2	1496	4305
TRG-7	12.2	20.9	3.6	4.5	8.3	997	3969
TRG-22	16.4	24.8	3.9	5.1	10.6	1746	4905
ICPL-85063	17.4	26.8	4.0	5.1	12.5	2060	5789
SEm±	0.1	0.6	0.03	0.03	0.09	26.92	87.51
CD (P=0.05)	0.3	1.3	0.1	0.1	0.2	54	176
Spacings							
45 x 15 cm (1,48,148 plants ha^{-1})	14.9	24.6	3.9	5.3	10.8	1859	5648
60 x 15 cm (1,11,111 plants ha^{-1})	15.1	24.2	3.9	4.8	10.6	1493	4623
75 x 15 cm (88,888 plants ha^{-1})	15.4	23.4	3.8	4.6	10.6	1276	3955
SEm±	0.1	0.5	0.03	0.03	0.08	23.31	75.79
CD (P=0.05)	0.3	1.1	0.1	0.1	NS	47	153
Interaction							
SEm±	0.2	1.0	0.05	0.06	0.15	46.62	152
CD (P=0.05)	0.6	2.2	0.1	0.1	0.3	94	305

spacing while the lower seed and stalk yields were recorded with variety TRG-7 at wider spacing.

Among the interaction effects, ICPL-85063 variety recorded the highest seed yield and stalk yield at closer spacing of 45x15 cm which was on par with TRG-22 at the same spacing. Similar findings were reported by Siag *et al.*(1993), Puste and Jana (1996), Srinivasan *et al.* (1997), Karle and Pawar (1998), Desai and Intwala (1999), Islam *et al.* (2008).

In conclusion, the present study has revealed that the variety ICPL-85063 spaced at a spacing of 45x15 cm was the best in realizing better growth, yield and economic returns.

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