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Evaluation of long duration genotypes of Pigeonpea (*Cajanus cajan* L. Millsp.) for growth, yield and yield attributes in Prayagraj region

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Abstract
Pigeon pea (*Cajanus cajan* L. Millsp.) is one of the important tropical pulses grown across the world. A field experiment was conducted during Kharif 2019-20 at the field experimentation center of Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture Technology & Sciences, Prayagraj. The experiment was carried out in Randomized block design with 16 genotypes to evaluate the better performing genotype of pigeonpea for growth, yield and yield attributes in agro climatic conditions of Prayagraj. Significant differences in growth, yield and yield attributes were recorded among the genotypes. Results revealed that the genotypes NL-13 and NL-7 recorded higher yield than the check variety Chamatkar. Among the 16 genotypes, NL-13 gave best result with 291.13 pods plant^{-1} and 2.86 kg seed plot^{-1} followed by the genotype NL-7 with 275.03 pods plant^{-1} and 2.53 kg plot^{-1} respectively.

Keywords: Evaluation, *Cajanus cajan* L. Millsp. Prayagraj

Introduction
Pulses are legumes and rich source of protein to most of the world's marginal and vegetarian population. Pigeonpea represents about 5% of world legume production (Hillocks *et al.*, 2000) [5] with more than 70% being produced in India (Singh *et al.*, 2014).
It is mainly cultivated in Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh and Uttar Pradesh. In Karnataka, it is grown in area of about 1.1 million ha with production of 0.73 million tones and productivity of 665 kg/ha (Annual report of AICRP on pulses, 2017-2018).
Pigeonpea plant is normally erect in nature and is branched. It is a short day plant and C3 type in metabolism. The optimum temperature required for growth is 29-36 °C (Sarkar *et al.*, 2018) [11]. The seeds of pigeonpea are consumed as a green vegetable and as of dry pulse because it is an important source of protein, carotene and ascorbic acid. It has a good source of protein content (20-22%), 1.2% fat, 65% carbohydrate and 3.8% ash (FAO 1982) [4].
In India and Africa the split peas are mainly used in the preparation of dhal. In India, it is considered to be a balanced diet when they are consumed with cereals mainly with rice.
Pigeonpea is a versatile crop grown in many parts of the world as a windbreak, cover crop and for green manure purpose (Cook *et al.*, 2005) [3]. Pigeonpea cultivation enhances soil aeration through its deep taproot system and also brings essential minerals into the top horizons of the soil.
It is used in many traditional medicines in India, China, Africa and some other countries (Saxena *et al.*, 2010) [12]. An isoflavanone, Cajanol which is found in the roots found to be effective against the human breast cancer under *in-vitro* conditions (Luo *et al.*, 2010) [7]. University of Philippines in a study concluded that pigeonpea crop can be used for curing diabetes and hyperlipidaemics (Panlasigui *et al.*, 1995) [9].

Materials and Methods
Experimental location
A field experiment was conducted during Kharif 2019-20 at the field experimentation center and Seed Testing Laboratory of the Department of Genetics and Plant Breeding, SHUATS, Naini, Prayagraj.
(Longitude 81.8463^{0}E, Latitude 25.4358^0 N,
Altitude: 98 m above sea level).

Genotypes and Experimental design
Sixteen long duration pigeonpea genotypes (NL-1, NL-2 NL-3, NL-4, NL-5, NL-6, NL-7,

NL-8, NL-9, NL-10, NL-11, NL-12, NL-13, NL-14, NL-15 and NL-16) obtained from IIPR, Kanpur and the local check Chamatkar were evaluated in randomized block design with three replications to identify the better genotype for growth and yield parameters and to know the suitable genotype for this region.

Table 1: Data collection and analysis

S.no	Genotypes	Days to 50% flowering	Days to maturity	Plant height (cm)	No of primary branches plant^{-1}	No of secondary branches plant^{-1}	No of clusters plant^{-1}	No of pods plant^{-1}	Seed weight plant^{-1} (g)	Seed weight plot^{-1} (kg)	100 seed weight (g)
1	NL-1	182.67	263.00	221.80	13.40	8.33	17.97	126.50	40.88	1.93	13.73
2	NL-2	178.67	254.33	257.93	23.43	23.53	29.33	140.37	31.87	1.68	13.46
3	NL-3	176.67	255.00	260.06	25.53	18.27	26.43	154.97	39.98	2.46	14.44
4	NL-4	175.67	254.33	263.95	24.77	17.53	19.20	135.30	35.86	2.16	13.53
5	NL-5	176.00	254.00	255.56	24.57	10.30	19.13	142.93	43.04	2.38	14.39
6	NL-6	177.33	254.67	256.70	21.77	19.83	27.07	145.30	38.29	1.47	13.09
7	NL-7	175.67	253.67	263.92	21.53	35.20	46.30	275.03	81.89	2.53	14.53
8	NL-8	178.00	254.00	261.55	20.63	23.13	22.10	164.17	67.63	2.12	14.03
9	NL-9	177.00	255.00	249.78	24.13	18.10	18.23	130.00	46.43	1.18	13.27
10	NL-10	174.33	253.00	233.40	24.40	26.00	28.03	150.77	35.94	1.90	13.43
11	NL-11	177.67	253.00	254.37	28.03	22.47	28.23	175.23	46.18	1.59	14.33
12	NL-12	173.67	254.67	238.75	20.37	33.00	38.10	163.47	48.33	2.27	14.2
13	NL-13	175.33	252.00	265.87	28.10	44.23	44.90	291.13	86.52	2.86	14.73
14	NL-14	177.67	254.33	258.47	25.73	20.77	24.57	208.60	47.42	1.86	14.00
15	NL-15	177.67	256.00	262.23	26.63	27.60	27.27	199.73	46.34	1.58	14.03
16	NL-16	175.67	254.00	259.70	23.27	25.13	31.30	210.10	43.18	1.72	13.97
17	Check (Chamatkar)	177.00	256.67	248.57	14.60	17.03	17.17	153.60	78.63	2.48	13.92
18	G. mean	176.86	254.80	253.68	22.99	22.97	27.37	174.54	50.50	2.01	13.94
19	F Test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
20	SE(m)	0.76	0.95	1.05	0.59	0.67	0.74	2.25	1.09	0.02	0.18
21	CD at 5%	2.20	2.73	3.03	1.69	1.92	2.13	6.50	3.13	0.05	0.51
22	CV	0.75	0.64	0.72	4.43	5.02	4.69	2.24	3.73	1.36	2.22

Data was collected on Days to 50% flowering, Days to maturity, Plant height (cm), No of primary branches plant^{-1}, number of secondary branches plant^{-1},
No of cluster plant^{-1}, No of pods plant^{-1}, Seed weight plant^{-1}, Seed weight plot^{-1} and one hundred seed weight.

Results and Discussion

All the genotypes investigated for better growth and yield performance displayed considerable amounts of differences in their mean performance with respect to all the characters studied.

50% flowering recorded data in NL-12 (173.67 days) was found to be minimum and maximum in NL-1 (182.67 days).

Days to maturity recorded data in NL-13 (252.00 days) was found to be minimum and maximum in NL-1 (263.00days).

Plant height of (265.87 cm) in NL-13 was found to be highest and lowest in NL-1 (221.80 cm).

Maximum number of primary and secondary branches plant^{-1} was recorded by the genotype NL-13 (28.10) and (44.23) and NL-1 recorded minimum of (13.40) and (8.33) respectively.

NL-7 recorded clusters of (46.30) per plant which was maximum and minimum of (17.17) was recorded by Chamatkar.

Number of pods plant^{-1} was maximum in NL-13 (291.13 pods) and minimum in NL-1 (126.50 pods).

Seed weight per plant is highest in NL- 13 (86.52 g) genotype while lowest is recorded in the genotype NL- 2 (31.87 g).

NL-13 recorded the highest seed weight per plot (2.86 kg plot^{-1}) and NL-9 recorded the lowest (1.18 kg plot^{-1}).

Conclusion

The overall performance of pigeonpea genotypes under study judged on the basis of positive results obtained indicated that, the genotype NL-13 had shown superior performance with respect to growth, yield under agro climatic conditions of Prayagraj region and recorded the maximum of (2.86 kg seed per plot). Similarly, the performance of at par genotypes like NL-7, NL-5 and NL-3 were found suitable for cultivation in Prayagraj region.

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