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Evaluation of pre-released bold seeded lentil varieties for growth and yield potentiality in the Gangetic plains of West Bengal

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ABSTRACT

A study was conducted for two consecutive year (2012-2013 and 2013-2014) to assess the performances of sixteen pre-released and two standard varieties of bold seeded lentil for their growth and productivity potential. Germination of seed required 4 to 7 days. The duration of germination to branch initiation phase was 11 to 13 days; flower initiation required 32 to 57 days, in first year and 29 to 36 days in the second year. Significant differences were observed in plant height, nodule number, dry matter accumulation, yield and yield attributes of the crop. The dry matter accumulation was better in the second year. The seed yield was maximum in PL-129 in both the year. The second year yield was lower than the first year, as it was exposed to higher temperature during the reproductive phase of the crop. The maximum productivity of lentil would be archived when the maximum and minimum temperature during 100% flowering ranged from 24.6 to 28.6 and 10.1 to 10.9ÚC respectively.

***Keywords*:** Growth attributes, lentil, pre-released variety, yield attributes

Lentil is a winter season crop growing in the span of November- March in West Bengal. The Gangetic plains of West Bengal is marked by short winter and mild temperature.Because of the temperature sensitivity of this crop, selection of proper varieties of lentil is important for better productivity of this crop. Bhattacharyya (2009) assessed several lentil genotypes for their yield variability under non-irrigated and irrigated conditions. Ellis *et al.* (1995) observed that the duration from sowing to flowering is an important parameter for yield variability in pulses. However the impact of temperature on lentil varieties has not been evaluated elaborately in the Indo Gangetic Plains of West Bengal. The present experiment has been framed to address this vacuum.

MATERIALS AND METHODS

The experiment was carried out during winter (November-March) seasons of 2012-13 and 2013-14 at the District Seed Farm, AB block, Kalyani, BCKV, (Latitude 22Ï58′ N and Longitude 88Ï32′ E), West Bengal, India. The study site is flat and is located at an

Table 1: Description of lentil genotypes and varieties used in the experiment

Sl. No.	Entry	Source	Pedigree
1	L 4076	IARI, New Delhi	Pl 234 x PL 639
2	IPL -324	IIPR, Kanpur	(IIL 7659 X DPL 58) X KL-178
3	KLB-314	CSA, Kanpur	KL 225 X KLB 97-6
4	L 4707	IARI, New Delhi	L 4650 X L 4076
5	VL 521	VPKAS, Almora	VL 501X(Precoz x L 4076)
6	SKUA-L-9	Srinagar	Sel. From EC 3109
7	LH 07-27	CCS HAU, Hisar	LH 84-8 X L 4641
8	LL 1210	PAU, Ludhiana	LL 699 X FLIP 91 – 51 L
9	IPL 325	IIPR, Kanpur	(IIL 101 X EC 362) X DPL 62
10	PL 129	Pantnagar	PL 639 X L 4188
11	RVL 48	Sehore	JL 1 X DPL 62
12	PL 122	Pantnagar	PL 01 X FLIP 96 – 51
13	LL 1204	PAU, Ludhiana	LL 148 X DPL 58
14	L 4706	IARI, New Delhi	PL 234 X PL 639
15	KLB 345	CSA, Kanpur	Precoz X KLB 231
16	SKUA-L-2-96	Srinagar	KLF 221 X L 1
17	K-75 (Check variety)	CSAU, Kanpur	Sel. From Bundelkhand Local
18	DPL-62 (Check variety)	IIPR, Kanpur	JL 1 x LG 171

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altitude of 9.75 m above mean sea level (AMSL). The experimental site falls under tropical humid climate, experiences three distinct seasons (summer, rainy and winter). The mean annual temperature falls below 20 ÚC in November and continued up to early part of February. The maximum and minimum RH ranged from 85-100% and 22-96% respectively. The soil contents 51% sand, 18.7% silt and 30.4% clay and is classified as sandy loam. The pH of the soil is 7.35 having total nitrogen, available phosphorus, available potassium and organic carbon as 298 kg ha^{-1}, 30.2 kg ha^{-1}, 195 kg ha^{-1} and 0.48%, respectively.The experiment was conducted in the winter season of 2012-2013 and 2013-2014 in RBD with sixteen pre released bold seeded varieties and two check varieties (K-75, DPL-62) for their growth and productivity. Each treatment was allotted in a plot of 4×2.0 m with two replications. Each treatment received 20, 40 and 40 kg N, P_2O_5 and K_2O ha^{-1} through urea, SSP and MOP. The description of pre released lentil varieties is given in table 1. The duration of the different phenophases, plant height, nodule number, dry matter accumulation, yield attributes and yield were estimated.

RESULTS AND DISCUSSION

Germination

The germination phase required 4 to 7 days in 1st year. Out of 16 pre released varieties 9 required 5 days, and 5 required 6 days for germination. The varieties VL 521 and SKUAL-9 needed 4 days but KLB-314, LL-1210 required 7 days. In the 2nd year the range of duration for germination remained same (Table 2). However the maximum and minimum temperature differed in two different years (Table 3). During germination, maximum temperature ranged from 28.7 to 30.8 ÚC and minimum temperature ranged from 15.5 to 21.6 ÚC in the 1st year which was quite higher than 2nd year temperature during the phenophase. The duration of germination to branch initiation was 11 to 13 days in the 1st year and 6 to 12 days in the 2nd year. During this phase, the maximum temperature ranged from 26.5 to 27.2 ÚC in the 1st year and 25.7 to 26.9ÚC in the 2nd year. The minimum temperature ranged from 10 to 14 ÚC in 2nd year where as 11.4 to 12 ÚC in the 1st year. The wide variation in the duration observed in the 2nd year was due to variation of minimum temperature.Flower initiation recorded wide variation. The variety K-75 initiated the flower 25 days earlier in the 2nd year than the 1st year. During this phenophase the minimum temperature ranged from 4.2 to 14.2 ÚC in the 1st year but in the 2nd year it ranged from 9.2 to 11.6 ÚC. The fluctuation in the minimum temperature helped the crop to initiate flower earlier in the 2nd year than the 1st year. Parya *et al.* (2010) observed that the higher minimum temperature in winter season shortened the duration of phenophase of winter crop.

Table 2: Duration of different phenophases (in days) of lentil genotypes

Genotypes	Germination		Branch initiation		Flower initiation		50% flowering		100% Flowering		Maturity		Total	
	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14
L 4076	5	5	12	10	33	34	16	28	12	17	20	29	98	123
IPL -324	6	4	11	10	33	36	16	26	10	17	22	28	98	121
KLB-314	7	6	12	9	46	34	4	31	15	17	18	21	102	118
L 4707	6	5	11	6	32	36	18	27	9	15	22	22	98	111
VL 521	4	5	12	11	46	33	19	32	12	17	32	33	125	131
SKUA-L-9	4	6	12	10	46	32	19	32	12	16	32	20	125	116
LH 07-27	5	7	12	11	32	29	19	35	10	15	24	32	102	129
LL 1210	7	6	12	11	38	32	24	33	14	16	11	30	106	128
IPL 325	6	5	12	11	46	34	6	34	13	16	19	28	102	128
PL 129	5	5	12	12	41	33	8	35	16	16	20	26	102	127
RVL 48	6	7	11	9	43	33	6	33	10	16	26	11	102	109
PL 122	5	6	12	12	34	30	28	35	13	17	22	25	114	125
LL 1204	5	5	12	12	43	30	15	35	18	18	9	25	102	125
L 4706	6	5	13	12	46	31	7	36	17	14	13	12	102	110
KLB 345	5	7	13	12	40	30	17	34	19	16	13	27	107	126
SKUA-L-2-96	5	6	12	12	48	32	6	35	22	16	13	28	106	129
K-75	5	6	12	11	57	32	17	32	4	19	19	28	114	128
DPL-62	5	6	12	11	43	33	21	15	12	17	21	29	114	108

Plant height

The plant height recorded a continuous increase throughout the period of observation (up to 65 DAE in most of the genotypes) (Table-4). In some of the genotypes the plant height recorded less on 72 DAE because of the drying up of stem. The pooled mean result showed that significant difference existed among the different genotypes throughout the growth phase. On 30 DAE the IPL-324 recorded the maximum plant height which was at par with L4076 and L4707. The minimum plant height was recorded in PL-122. Among the different genotypes KLB-314, VL-521, SKUA-L-9, PL-129, VL-48 and L-4706 had no significant difference among themselves. The dwarf varieties were LH-07-27, LL-1210, LL-1204, KLB-345 and DPL-62 had also no significant differences in the plant height. On 72 DAE the maximum height was recorded in IPL-324 followed by L-4076 although these two genotypes differ significantly in plant height. The rate of increment of height was maximum during 44 to 51 DAE in case of the genotypes L-4076, L-4707, SKUA-L-9, PL-129, LL-1204, L-4706, KLB-345, K-75 and DPL-62. However IPL-324 recorded the maximum rate of increment during 65 to 72 DAE. During 44 to 51 DAE maximum temperature ranged from 20 to 26.9 ÚC hovered around 10.6 to 14 ÚC. This temperature

Table 3: Ambient temperature (ÚC) during the phenophases of lentil genotypes in 2012-13

Genotypes	Germination		Branch initiation		Flower initiation		50% Flower initiation		100% Flower initiation		Maturity	
	Max. temp.	Min. temp.	Max. temp.	Min. temp.	Max. temp.	Min. temp.	Max. temp.	Min. temp.	Max. temp.	Min. temp.	Max. temp.	Min. temp.
L 4076	30.4	15.6	26.5	11.4	26	10.5	29.1	13.2	25.2	7.2	25.5	12.2
IPL -324	30.8	15.5	26.5	11.4	26	10.5	29.1	13.2	22.6	5.6	25.5	12.2
KLB-314	29	21.6	26.9	12	28.7	12.5	23.4	12.6	29.2	12.6	31.1	12.9
L 4707	30.8	15.5	26.5	11.4	25.5	9.2	28	13.2	25	7	25.5	12.2
VL 521	28.7	15.5	26.8	11	25.9	6.9	26.2	10	30.2	14.1	33.8	15.6
SKUA-L-9	28.7	15.5	26.8	11	25.9	6.9	26.2	10	30.2	14.1	33.8	15.6
LH 07-27	30.4	15.6	26.5	11.4	25.5	9.2	25.4	13.1	25.2	7.2	31.1	12.9
LL 1210	29	21.6	26.9	12	18.6	4.2	26.2	10	25	13.4	31	14.7
IPL 325	30.8	15.5	27.2	12	27	11.7	23.6	9	28.7	10	31.1	12.9
PL 129	30.4	15.6	26.5	11.4	21.5	5.7	29.1	13.2	28.6	10.1	31.1	12.9
RVL 48	30.8	15.5	26.5	11.4	22	6.7	29.1	13.2	25	7	31.1	12.9
PL 122	30.4	15.6	26.5	11.4	23.5	14.2	26	9.4	28.5	14.8	34.9	16.9
LL 1204	30.4	15.6	26.5	11.4	22	6.7	22.6	5.6	30.2	14.1	31.1	12.9
L 4706	30.8	15.5	26.9	12	28.7	12.5	24.1	7.2	26.9	8.6	31.1	12.9
KLB 345	30.4	15.6	26.5	11.4	18.6	4.2	23	6	30.2	14.1	31	14.7
SKUA-L-2-96	30.4	15.6	26.5	11.4	28.7	12.5	24	7.3	30.2	14.1	31	14.7
K-75	30.4	15.6	26.5	11.4	22	6.7	28	10.4	25	13.4	34.9	16.9
DPL-62	30.4	15.6	26.5	11.4	22	6.7	26.2	10	30.2	14.1	34.9	16.9
L 4076	27.5	13.2	25.7	12.5	20	11.3	21.5	9	28.5	13.6	33	16.6
IPL -324	27.7	15.6	26.6	12.4	20	10.6	21.5	9	28.5	13.6	32.5	19.9
KLB-314	27.4	13.8	25.7	12.5	20	11.3	24.6	9.7	22.5	16.5	31	14.9
L 4707	27.5	13.2	26.5	14	24	9.6	23.5	8.7	27	12.2	29.6	16
VL 521	27.5	13.2	26.9	11.8	20	11.3	24.6	9.7	22.5	16.5	32.5	19.6
SKUA-L-9	27.4	13.8	26.9	11.8	20	11.6	25.5	9.5	25.4	16.5	29.6	16
LH 07-27	27.6	15.5	25.4	10.9	24	9.6	25.5	9.5	28.5	13.6	35.2	16.6
LL 1210	27.4	13.8	25.5	12.5	20	11.3	24.6	9.7	21	16.4	35.2	16.6
IPL 325	27.5	13.2	26.9	11.8	20	10.6	25.2	8.2	24.6	10.9	34	18.6
PL 129	27.5	13.2	25.5	12.5	20	10.6	25.2	8.2	24.6	10.9	31	14.9
RVL 48	27.6	15.5	26.9	11.8	20	11.3	25.2	10.5	22.5	16.5	28.5	16.5
PL 122	27.4	13.8	25.4	10.9	20	11.6	24.6	9.7	22.5	16.5	33	16.6
LL 1204	27.5	13.2	25.5	12.5	24	9.6	24.6	9.7	23.7	10.3	34	16.6
L 4706	27.5	13.2	25.5	12.5	20	11.6	24.4	9.2	21	16.4	28.5	16.5
KLB 345	27.6	15.5	26.5	10	20	11.3	25.5	9.5	25.4	16.5	33	16.6
SKUA-L-2-96	27.4	13.8	25.4	10.9	20	10.6	24.4	9.2	23.7	10.3	35.2	16.6
K-75	27.4	13.8	25.5	12.5	20	11.3	25.5	9.5	23.7	10.3	35.2	16.6
DPL-62	27.4	13.8	25.5	12.5	20	10.6	24.6	9.7	22.5	16.5	35.2	16.6

ranged was congenial for height increment in most of these genotypes. In case of IPL-324 and L-4076 the rate of height increment was maximum during 65 to 72 DAE, when the maximum and minimum temperature was 28.5 and 13.6 ÚC respectively. This showed that these two genotypes could tolerate a bit higher temperature then the other genotypes. He and Rajaram (1993) observed that the plant height is more sensitive to the temperature in winter crop. The plant height was higher in 2nd year than the 1st year.

Nodule number

Nodule number increase from 30 to 44 DAE in L-4076, KLB-314, IPL-325, PL-129, LL-1204, L-4706, KLB-345, SKUA-L-96, K-75 AND DPL-62 there after the nodule number decline gradually (Table 5). But in the genotypes SKUA-L-9, LH-07-27, LL-1210, PL-122 nodule number increased up to 51 DAE. There after it decline. The genotypes L-4707 and VL-521 showed an increment in nodule number up to 58 DAE. Significant differences existed among the genotypes. On 44 DAE maximum nodule number per plant was noted in KLB-314. Which was significantly higher than all the genotypes except LL-1204. The genotypes L-4706 and IPL-324 had no significant differences. The two check genotypes also did not differ significantly in nodule number. The rate of nodule initiation was highest in between 30 to 37 DAE that is during branch initiation to flower initiation. When the maximum temperature ranges in between 23.5 to 28.7 ÚC and the minimum temperature ranged from 9.2 to 12^0C

Dry matter accumulation

The dry matter accumulation increased throughout the growth phases and the maximum increment was noted SKUA-L-2-96 on 72 DAE which was significantly higher in all the varieties. During initial phase (up to 58 DAE) the KLB-314 recorded maximum dry matter accumulation followed by L-4076 and SKUA-L-9 (Table 6). Minimum dry matter accumulation on 72 DAE was observed in PL-122. These genotypes recorded the low dry matter accumulation throughout the growth phases. On 72 DAE the high dry matter accumulation genotypes were SKUA-L-296, KLB-314, LL1210, SKUA-L-9, VL-521 and LH-0727 which produce the dry matter above 200 gm per m². Among this high producing genotypes VL-521, SKUA-L -9 did not differ significantly. Similarly LL-1210 and KLB-314 also had no significant different. The rate of dry matter accumulation was maximum during 30 to 37 DAE in

Table 4: Changes in plant height (cm) in lentil genotypes (Pooled)

Genotypes	Day after emergence						
	30	**37**	**44**	**51**	**58**	**65**	**72**
L 4076	17.1	20.9	24.4	29.3	32.1	36.2	42.9
IPL -324	17.8	22.5	27.0	29.4	33.4	37.3	45.5
KLB-314	14.9	18.5	23.8	27.6	29.8	42.7	38.7
L 4707	17.0	20.6	23.9	30.3	33.8	37.1	36.5
VL 521	15.5	16.1	21.2	24.4	26.9	36.6	35.6
SKUA-L-9	15.1	19.1	22.2	27.0	31.7	41.1	38.1
LH 07-27	11.9	13.9	18.7	23.1	26.4	37.7	35.1
LL 1210	12.5	16.5	19.6	23.6	26.4	44.2	40.3
IPL 325	14.2	18.1	25.1	27.8	31.5	43.8	39.2
PL 129	14.8	17.0	21.8	27.8	31.3	39.7	38.4
VL 48	15.3	18.9	23.8	27.9	29.4	35.4	35.8
PL 122	10.5	13.4	16.4	20.8	24.7	33.3	32.3
LL 1204	12.8	15.6	19.0	27.8	31.6	42.5	38.2
L 4706	15.9	20.2	23.6	32.5	35.1	45.6	42.5
KLB 345	12.0	16.3	20.4	27.6	31.1	41.6	37.8
SKUA-L-2-96	16.4	20.4	25.0	29.6	34.1	43.0	41.4
K-75	14.5	18.6	21.7	27.5	30.9	39.6	40.1
DPL-62	12.7	17.4	21.8	26.8	29.1	38.4	40.0
SEm (±)	**0.4**	**0.6**	**0.6**	**0.8**	**0.7**	**1.0**	**0.5**
LSD(0.05)	**1.3**	**1.6**	**1.8**	**2.3**	**2.0**	**2.8**	**1.5**

Table 5: Changes in nodule number indifferent lentil genotypes (Pooled)

Genotypes	Day after emergence						
	30	**37**	**44**	**51**	**58**	**65**	**72**
L 4076	13.3	22.0	25.2	23.9	17.9	13.3	10.3
IPL -324	18.0	21.8	25.0	27.5	27.1	17.2	15.5
KLB-314	14.5	20.5	31.7	30.0	23.1	17.0	13.0
L 4707	8.8	13.2	16.3	18.9	24.4	10.9	8.5
VL 521	10.2	14.3	17.5	20.0	22.7	14.3	12.5
SKUA-L-9	9.8	14.5	18.6	23.3	13.8	12.3	11.3
LH 07-27	13.8	15.2	19.9	25.0	17.4	12.9	8.7
LL 1210	16.4	18.8	21.6	29.3	18.3	12.0	7.7
IPL 325	14.9	19.2	22.1	17.0	14.5	12.3	9.5
PL 129	15.2	19.6	28.2	18.3	13.9	12.3	8.3
RVL 48	7.7	11.5	15.0	18.3	12.4	10.0	8.4
PL 122	7.4	12.8	16.0	26.7	14.7	12.0	9.2
LL 1204	11.2	17.8	30.8	16.6	12.0	10.8	8.6
L 4706	11.8	17.4	28.5	17.5	13.5	12.3	9.0
KLB 345	8.8	14.4	28.7	19.0	16.5	12.6	9.3
SKUA-L-2-96	15.6	21.8	28.5	15.8	12.7	10.3	7.0
K-75	11.9	19.9	27.8	20.3	12.7	10.8	7.2
DPL-62	11.6	18.3	26.7	15.3	13.0	10.8	8.3
SEm (±)	**0.8**	**0.5**	**0.6**	**0.5**	**0.7**	**0.6**	**0.6**
LSD(0.05)	**2.3**	**1.6**	**1.9**	**1.6**	**2.1**	**1.7**	**1.8**

L-4076, SKUA-L-9, RVL-48 and P-122. Dry matter accumulation differs due to temperature differences during the different phenophase. Basu *et al.,* 2012 also reported that the thermal regimes or the significantly predicted the stem and dry matter accumulation in wheat during winter season.

Table 6: Changes in dry matter accumulation in lentil genotypes (gm^{-2}) (Pooled)

Genotypes	Day after emergence						
	30	**37**	**44**	**51**	**58**	**65**	**72**
L 4076	34.9	60.9	86.6	112.9	141.4	146.2	151.8
IPL -324	48.5	57.3	80.9	104.8	129.6	141.5	177.4
KLB-314	59.5	75.3	113.5	146.5	163.1	189.4	231.0
L 4707	43.1	55.3	80.4	112.0	133.0	137.6	172.2
VL 521	34.5	41.5	52.1	73.4	77.7	87.5	215.6
SKUA-L-9	35.9	63.9	74.1	109.1	138.8	152.3	217.4
LH 07-27	31.1	47.4	68.1	79.8	88.9	112.0	200.2
LL 1210	33.9	41.0	49.1	68.8	83.3	107.4	226.6
IPL 325	25.1	38.0	82.3	75.7	114.9	119.4	149.7
PL 129	52.9	68.8	86.2	106.3	120.0	127.9	177.6
RVL 48	37.9	62.0	67.8	89.9	105.4	112.3	145.3
PL 122	31.9	60.2	64.9	74.0	79.0	85.1	93.1
LL 1204	36.9	65.4	73.4	103.4	111.6	117.4	148.6
L 4706	40.0	65.3	65.2	88.3	96.5	106.2	148.5
KLB 345	31.1	43.0	43.8	64.4	81.7	85.9	160.3
SKUA-L-2-96	40.1	56.3	80.7	107.8	113.8	150.2	277.3
K-75	37.8	46.9	56.5	69.2	74.5	93.3	148.9
DPL-62	39.3	46.6	63.2	72.9	78.9	89.4	195.1
SEm (±)	**1.6**	**1.9**	**6.4**	**1.6**	**1.5**	**1.4**	**2.8**
LSD(0.05)	**4.7**	**5.5**	**18.3**	**4.6**	**4.4**	**4.0**	**8.1**

Yield and yield attributes

The number of branches per plan at maturity was highest in L-4707, VL-521, SKUA-L-296 and DPL-62. No significant differences did exist among the genotypes KLB-314, L-4707, VL-521, SKUA-L-9, PL-129, RVL-48, PL-122, SKUA-L-296, K-75 and DPL-62 (Table7). The maximum no of pods per plant was recorded in PL-129 which was significantly higher in all the varieties. The high yielder genotypes were PL-129, L-4706, SKUA-L-9, AND IPL-325 which produce 50 or higher no of pods per plant. The lowest no of pod was recorded in VL-521. The test weight was maximum in SKUA-L-296 but yield was low because of lower no of pods per plant.

The seed yield differed in two different years (Table 7), first year crop recorded higher yield than the second year crop in all genotypes. During the reproductive phase the 2nd year crop was exposed to higher minimum temperature which led to flower drop, drying of the floral part and ultimate reduction of yield (Tzudir *et al.,* 2014). Erskine *et al.* (1989) observed that the productivity was related to the temperature during reproductive period. Summerfield *et al.* (1989) observed that the higher temperature during the reproductive phase accelerated progress towards reproductive maturity and reduced seed yield. In the present experiment the minimum temperature during the reproductive phase in the 1st year ranged in between 11.2 and 14.1 ÚC where as in the 2nd year, it was in between 14.1 and 16.8 degree Celsius; there was an approximate rise of 3 ÚC in the 2nd year. The maximum productivity of lentil would be achieved if the maximum and minimum temperatures ranged from 24.6 to 28.6 ÚC and 10.1 to 10.9 ÚC during 100% flowering stage. Two years pooled mean result showed that the maximum seed yield was obtained in PL-129 (1657.40 kg ha^{-1}) because of highest no of pods per plant, higher no of branch per plant and the moderate test weight. Among the different genotypes the high yielder genotypes were PL-129, L-4706, SKUA-L-9, IPL-325, IPL-324, RVL-48 and K-75 which produced above 1000 kg ha^{-1} on an average. The medium yielder genotypes were L-4707, KLB-314, SKUA-L-296, DPL-62, LL-1204 and KLB-325 whose productivity exceeded 800 kg ha^{-1}. The low yielder group comprised of VL-521, LH-0727, L-4076, LL-1210 and PL-122. These genotypes had lower no of pods per plant, branch per plant and test weight. The maximum yield was recorded in VL-521 (387.55 kg ha^{-1}).

Table 7: Yield attributes and seed yield in lentil genotypes (Pooled)

Genotypes	Yield attributes and seed yield					
	No. of branch plant^{-1}	No. of pods plant^{-1}	Test Wt. (gm.)	Seed yield (kg ha^{-1})		
				2012-2013	2013-2014	Pooled
L 4076	9	19	2.80	732.4	482.6	607.48
IPL -324	9	49	2.95	1203.3	1089.2	1146.20
KLB-314	11	41	2.20	1152.3	783.6	967.95
L 4707	12	43	2.35	1155.7	838.5	997.08
VL 521	12	13	2.08	336.7	438.4	387.55
SKUA-L-9	11	51	3.75	1372.6	1135.6	1254.10
LH 07-27	10	19	2.40	729.7	483.7	606.70
LL 1210	9	23	2.20	1019.9	529.9	774.86
IPL 325	7	50	3.60	1372.3	1129.4	1250.83
PL 129	11	61	3.60	1712.4	1602.4	1657.40
RVL 48	11	47	2.20	1164.2	864.5	1014.35
PL 122	11	27	1.70	1027.5	548.2	787.84
LL 1204	8	33	2.50	1058.2	590.4	824.28
L 4706	9	59	2.60	1547.9	1219.5	1383.65
KLB 345	9	27	1.85	1049.5	564.7	807.05
SKUA-L-2-96	12	37	3.95	1122.3	774.3	948.25
K-75	11	45	2.60	1159.4	864.5	1011.94
DPL-62	12	35	2.65	1066.9	693.1	879.98
SEm (±)	**0.4**	**0.4**	**0.138**	**1.4**	**1.1**	**0.885**
LSD (0.05)	**1.2**	**1.0**	**0.398**	**4.1**	**3.3**	**2.544**

In the Gangetic West Bengal Pl-129, L-4706, SKUA-L-9 and IPL-325 may be selected for their better productivity potential.

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