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Estimation of heterosis for seed yield and yield components in pigeonpea [*Cajanus cajan* L. Millspaugh]

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Abstract
Exploitation of heterosis through the cultivation of hybrid cultivars is one of the landmark achievements of plant breeding. Heterosis breeding has been extensively used for improving yield potential in most of the crops through development of hybrids. Hence, an attempt was made in this study to assess 90 F_1 hybrids derived by crossing 6 lines with 15 genotypes of pigeonpea to identify the best heterotic combinations to achieve a quantum jump in yield. The results showed that a wide range of variation in the estimates of heterobeltiosis and standard heterosis in positive and negative direction was observed for seed yield per plant as well as remaining eleven traits. In case of seed yield per plant, heterobeltiosis ranged from -48.03 to 231.59 and standard heterosis varied from -64.93 to 286.72. The cross BSMR 736 X WRG 303 showed highest mean performance (241.01g) for seed yield per plant and it also exhibit 143.94%, 159.88% and 286.72% heterosis over better parent, standard check PKV-TARA and standard check AKT-8811, respectively. The crosses viz., BDN 711 x BAUPP 15-22, AKT 8811 x BAUPP 15-22, PKV TARA x ICPL 87, BDN 711 x CRG 2015-007, BDN 711 x BSMR 853, BSMR 736 x WRG 303 and AKT 8811 x NPMK 15-05 showing high mean performance and significant heterosis for seed yield per plant and its important components. These crosses could be utilized for their large-scale testing and general adaptability.

Keywords: Pigeonpea, heterosis, hybrids, line x tester, genotypes, *Cajanus cajan* L. Mill sp.

Introduction
Pigeonpea is the sixth most important pulse crop in the world. Globally, pigeonpea is grown on an area spanning 69.93 lakh hectares with a grain output of 59.61 lakh tonnes and a mean productivity of 852.42kg/ha (Anonymous, 2018) [3]. In India, pigeonpea is grown on 42.29 lakh hectares with production of 37.54 lakh tonnes with a productivity of 887kg/ha (Anonymous, 2020) [4]. The static plateau in pigeonpea productivity has become a national concern. Empirically narrow genetic base has been reported to be the major bottleneck in pigeonpea where only handful genotypes have been repeatedly exploited in breeding programme for genetic enhancement for yield. Thus, broadening genetic base is the priority area in yield enhancements programme in pigeonpea. Since the productivity is quite low and to augment the production, concerted efforts are needed to improve the productivity. The exploitation of heterosis is one of the breeding strategies to enhance the productivity.
Heterosis expresses the superiority of F_1 hybrid over its mid parental value in terms of yield and other characters. Heterobeltiosis is the estimate of the superiority of F_1 hybrid over its better parent out of two parents involved in the particular crosses. Standard Heterosis expresses the superiority of F_1 hybrid over its standard commercial check variety or hybrids. Exploitation of hybrid vigour is well thought-out to be one of the outstanding achievements of plant breeding. The study of magnitude and direction of heterosis are very important to know the potential of hybrids.

Material Methods
The experimental material in the present investigation consist of 21 diverse genotypes (6 females *viz*., BSMR-736, BDN-711, AKT-8811, PKV-TARA, Rajeshwari and ASHA and 15 males viz., BDN 2013-5, BSMR 853, ICPL 87, BDN 2014-1, CRG 2015-007, BAUPP 15-22, NPMK 15-05, BDN 2013-41, WRG 303, NPEK 15-25, ICPL 80338, ICPL 20338, ICPL 161, ICPL 88039 and PU 881). The crosses were made in a line X tester design during *Kharif* 2017-18. A set of 111 entries, including twenty one parents, their 90 crosses and standard check used from the parent PKV-TARA and AKT-8811 was sown in a Randomized Block Design

with three replications during *Kharif* 2019-20. Each entry was sown in a single row of 4 meter length keeping inter row and intra row distance of 90cm and 30cm, respectively. The observations were recorded as visual assessment as well as on measurement of individual plants. The individual plant observation were recorded on five randomly selected plants. The data were subjected to analysis for various characters for mean performance of parents and their hybrids and heterosis.

Results and Discussion

The result obtained from analysis of variance exhibited highly significant difference among the treatments studied *i.e.* 6 lines, 15 testers and their 90 crosses for all the 12 characters. This indicated the presence of ample amount of genetic variability for these characters. The exploitation of heterosis for developing high yielding commercial hybrids in pigeonpea has been found highly fruitful in spite of its often-cross-pollinated nature because significant heterosis is encountered in F_1 hybrids and successful and economical technology for commercial hybrid seed production is available.

Table 1: Analysis of Variance for different character in L x T mating design in pigeonpea

Source of Variations	D.F.	Days to 50% flowering	Days to maturity	Plant height (cm)	No. of primary branches /plant	No. of secondary branches /plant	No. of pods/plant	No. of clusters/ plant	No. of pods/ cluster	No. of seeds/pod	100 seed weight (g)	Harvest index (%)	Seed yield/ Plant (g)
Replicates	2	0.183	8.237	14.665	0.124	4.432	0.183	8.237	14.665	0.124	4.432	2.147	8.237
Parents (Line)	5	197.922**	744.222**	2224.127**	5.794**	131.521**	197.922**	744.222**	2224.127**	5.794**	131.521**	12.516**	744.222**
Parents (Testers)	14	1689.118**	5503.943**	15082.121**	19.064**	604.109**	1689.118**	5503.943**	15082.121**	19.064**	604.109**	17.424**	5503.943**
Parents (L vs T)	70	149.602*	269.435**	9487.920**	0.046	833.980**	149.602**	269.435**	9487.920	0.046**	833.980**	333.963**	269.435
Error	40	24.656	35.280	164.988	0.057	2.096	24.656	35.280	164.988	0.057	2.096	2.578	35.280

In present study, the estimates of heterosis over better-parent and standard variety (PKV-TARA and AKT-8811) were calculated for 90 $F_{1's}$ to assess their genetic potential as breeding material were presented in [Table-2]. The salient results obtained on different aspects are summarized below:

The estimates of heterosis for the days to 50% flowering in different crosses ranged from 12.44 to -23.1, 12.15 to -29.65, 13.57 to -30.15 and 25.56 to-22.78 per cent over mid parent, better parent standard check PKV-TARA and standard check AKT-8811 respectively. In present study, five hybrids *viz*., PKV TARA X ICPL 80338, BDN 711 X BDN 2014-1, Rajeshwari X CRG 2015-007, PKV TARA X ICPL 20338 and AKT 8811 X BAUPP 15-22 depicted significant and negative heterosis for all the three bases of heterosis estimation, which indicates the earliness of crosses. A particular cross which matured earlier was considered as better parent and accordingly heterotic effects were estimated and ranged from 19.61 to -10.5, 8.61 to -26.73, 15.27 to-27.62 and 30.99 to -17.74 per cent over mid parent, better parent, standard check PKV-TARA and standard check AKT-8811 respectively. Thirty six crosses registered significant negative standard heterosis in desirable direction over the standard variety PKV-TARA and twenty two crosses registered significant negative standard heterosis in desirable direction over standard variety AKT-8811. Among 90 crosses, the crosses BDN 711 x ICPL 20338, Asha x NPEK 15-25 and Asha x ICPL 20338 exhibited the highest significant negative standard heterosis, mid and better parent heterosis respectively. Similar results of high negative heterosis were also reported by Pandey and Singh (2002) [11], Phad (2003) [15] and Kandalkar (2007) [7].

Heterosis was ranged from 34.72 to -15.53, 29.41 to -31.04, 16.01 to -47.86 and 21.3 to -45.49 per cent over mid parent, better parent standard check PKV-TARA and standard check AKT-8811 respectively for plant height. The number of heterotic hybrids in addition to the magnitude of heterosis increased in negative direction indicating their utilization for breeding dwarf plant types. For number of primary branches per plant the range of heterosis over mid parent, better parent and standard check PKV-TARA and standard check AKT-8811 were from 269.75 to -46.28, 205.56 to -50.38, 115.69 to -49.02 and 205.56 to -27.78 per cent respectively. The cross combination AKT 8811 x ICPL 87, BSMR 736 x BDN 2014-1 and AKT 8811 x BDN 2014-1 exhibited the highest positive significant relative heterosis, heterobeltiosis and standard heterosis over the standard variety PKV TARA and also over the standard variety AKT 8811.

For the trait number of secondary branches per plant, heterosis was ranged from 201.37 to -100, 196 to -100, 93.84 to -50.95 and 133.05 to -41.03 per cent over mid parent, better parent standard check PKV-TARA and standard check AKT-8811 respectively. The cross combination for positive significant standard heterosis over both standard variety *i.e*., PKV TARA and AKT 8811 were recorded for BDN 711 x BDN 2014-1, AKT 8811 x WRG 303, Asha x CRG 2015-007 and BDN 711 x CRG 2015-007.

Heterosis for number of pods per plant, ranged from 281.42 to -37.41, 209.45 to -53.59, 134.3 to -57.93 and 158.45 to -53.59 per cent over mid parent, better parent standard check PKV-TARA and standard check AKT-8811 respectively. The estimates of heterosis for this trait revealed that the crosses BSMR 736 x ICPL 88039, BDN 711 x BAUPP 15-22, BSMR 736 x WRG 303, AKT 8811 x WRG 303, Asha x NPMK 15-05 showed significant positive heterosis over mid parent, better parent and both the standard check. Similar findings were also reported by Patel and Tikka (2008) [14] and Chandrirkala *et al.* (2010) [5] and Mallesh *et al.* (2016) [10].

The magnitude of heterosis for the trait number of clusters per plant ranged from 197.09 (BSMR 736 x ICPL 161) to -51.39 (AKT 8811 x ICPL 80338) over standard parent PKV TARA and 237.3 (BSMR 736 x ICPL 161) to -44.81 (AKT 8811 x ICPL 80338) over standard variety AKT 8811. For standard heterosis, heterobeltiosis and relative heterosis, the crosses viz., BSMR 736 x NPEK 15-25, BDN 711 x BDN 2013-41 and BSMR 736 x BSMR 853 were recorded first three positions, respectively.

For the trait number of pod per cluster heterosis exhibited by crosses over their corresponding mid parent, better parent,

standard check PKV-TARA and standard check AKT-8811 ranged from 61.04 to -46.34, 51.22 to -51.02, 44.10 to -48.84 and 40.01 to -50.00 respectively. Seven crosses out of 90 crosses exhibited significant positive heterosis over mid parent. The significant and positive heterobeltiosis was recorded by four crosses. For standard heterosis, heterobeltiosis and relative heterosis, the crosses viz., BSMR 736 x NPEK 15-25, BDN 711 x BDN 2013-41 and BSMR 736 x BSMR 853 were recorded first three positions, respectively.

Magnitude of heterosis for the trait number of seeds per pod ranged from 28.97 to -27.12, 25.45 to -32.81, 34.55 to -21.82 and 23.33 to -28.33 per cent over mid parent, better parent standard check PKV-TARA and standard check AKT-8811 respectively. Similar findings were also reported by Sinha *et al.* (1994) [18] and Patel (1990) [13], Wankhade *et al.* (2005) [19] and Kumar *et al.* (2016) [9].

For the trait 100 grain weight, among the 90 crosses, nineteen crosses exhibited significant and positive mid parent heterosis and eight crosses recorded positive and significant heterobeltiosis. Four crosses viz., BSMR 736 x PU 881, AKT 8811 x ICPL 88039, Rajeshwari x NPEK 15-25 and PKV TARA x BDN 2014-1 recorded positive and significant heterosis over both the standard parent and also recorded positive and significant average heterosis and heterobeltiosis. Similar findings have also been reported by Dhedhi *et al.* (2008) [6], Phad *et al.* (2009) [15], Chandrirkala *et al.* (2010) [5] and Parmar *et al.* (2012) [12].

The hybrids with positive heterosis for harvest index (%) are desirable to increase the yield. Heterobeltiosis for harvest index (%) ranged from -25.54 (Asha x ICPL 88039) to 46.65% (BDN 711 x BSMR 853). Nineteen crosses registered significant and positive heterobeltiosis while seventeen crosses exhibited significant and negative heterosis for this trait. Nine crosses exhibited significant positive standard heterosis over PKV-TARA and over AKT-8811 thirty six crosses exhibited significant positive standard heterosis for this trait.

Yield is a complex trait and end product of a number of components most of which are under polygenic control. All changes in yield must be accompanied by changes in one or more of the components. For seed yield per plant, the heterosis over better-parent varied from -48.03 (AKT 8811 x ICPL 80338) to 231.59% (BDN 711 x BAUPP 15-22). Forty six crosses registered positive significant heterobeltiosis for seed yield plant^{-1} while eighteen crosses showed negative significant heterosis over better parent. Standard heterosis among crosses ranged from -64.93 (AKT-8811 x ICPL 80338) to 159.88% (BSMR 736 x WRG 303) and -47.82 (AKT 8811 x ICPL 80338) to 286.72% (BSMR 736 x WRG 303) over standard PKV TARA and AKT 881, respectively. Forty five crosses recorded positive standard heterosis over check PKV-TARA while, fifty nine crosses registered standard heterosis in positive direction over check AKT-8811. The crosses viz., BDN 711 x BAUPP 15-22, AKT-8811 x BAUPP 15-22, PKV-TARA x ICPL 87, BDN 711 x CRG 2015-007, BDN 711 x BSMR 853, BSMR 736 x WRG 303 and AKT 8811 x NPMK 15-05 registered significant heterobeltiosis, relative heterosis and standard heterosis over both checks, indicating that these crosses may throw superior segregants for seed yield in the succeeding generations. Similar results of high degree of heterosis for seed yield plant^{-1} over standard check in pigeonpea was also reported by Anantha and Muthian (2007) [2], Kumar and Krishna (2008) [8] and Reddy *et al.* (2004) [17]. Acharya *et al.* (2009) [1] also found crosses exceeding standard heterosis can be recognized as promising for seed yield and its components.

Table 2: Percent mid parent heterosis (MP), heterobeltiosis (BP) and standard heterosis (SH) for different characters in pigeonpea

SN	Crosses	1. Days to 50% flowering				2. Days to Maturity				3. Plant Height (cm)			
		MP (%)	MP (%)	SH (%)		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)	
				PKV TARA	AKT 8811			PKV TARA	AKT 8811			PKV TARA	AKT 8811
1	BSMR 736 X BDN 2013-5	2.7	-4.17	9.8**	21.39**	1.21	-5.43*	7.55**	22.22**	8.32*	2.71	-2.79	1.64
2	BSMR 736 X BSMR 853	2.8	-0.94	6.03	17.22**	-1.38	-7.2**	3.95	18.13**	8.63*	1.23	-0.57	3.96
3	BSMR 736 X ICPL 87	10.35**	-1.52	-2.26	8.06*	7.55**	-7.29**	-8.4**	4.09	15.31**	-7.34	-21.38**	-17.8**
4	BSMR 736 X BDN 2014-1	-0.24	-5.03	4.27	15.28**	-4.4*	-12.75**	4.46	18.71**	13.06**	0.7	-14.56**	-10.67*
5	BSMR 736 X CRG 2015-007	12.44**	12.15**	11.31**	23.06**	3.49	1.5	4.29	18.52**	10.16**	-3.44	8.79*	13.74**
6	BSMR 736 X BAUPP 15-22	-0.26	-1.52	-2.26	8.06*	-3.34	-4.72	-3.09	10.14**	-7.33	-15.56**	-12.88**	-8.92*
7	BSMR 736 X NPMK 15-05	1.6	-1.43	4.02	15**	0.76	-1.97	2.4	16.37**	14.52**	7.81	3.62	8.34
8	BSMR 736 X BDN 2013-41	2.13	-4.01	8.29**	19.72**	-0.24	-5.99**	4.97*	19.3**	20.48**	13.87**	8.53*	13.47**
9	BSMR 736 X WRG 303	4.43	-0.91	9.55**	21.11**	7.06**	1.56	11.84**	27.1**	7.68*	-6.86	8.25*	13.19**
10	BSMR 736 X NPEK 15-25	2.27	-3.17	7.54*	18.89**	-1.79	-10.89**	8.06**	22.81**	5.8	-5.26	1.62	6.25
11	BSMR 736 X ICPL 80338	-1.66	-17.72**	-18.34**	-9.72**	-0.53	-18.06**	-19.04**	-7.99**	26.4**	-13.35**	-26.48**	-23.14**
12	BSMR 736 X ICPL 20338	-0.92	-17.97**	-18.59**	-10**	1.27	-17.19**	-18.18**	-7.02*	29.44**	-13.07**	-26.24**	-22.88**
13	BSMR 736 X ICPL 161	4.68	-3.8	-4.52	5.56	5.7*	-6.6**	-7.72**	4.87	6.19	-5	-19.4**	-15.73**
14	BSMR 736 X ICPL 88039	-5.43	-16.2**	-16.83**	-8.06*	-2.14	-16.49**	-17.5**	-6.24*	-4.98	-12.84**	-26.05**	-22.68**
15	BSMR 736 X PU 881	-0.29	-11.65**	-12.31**	-3.06	-1.73	-15.97**	-16.98**	-5.65*	-9.33	-19.08**	-31.35**	-28.22**
16	BDN 711 X BDN 2013-5	9.36**	-2.63	11.56**	23.33**	6.47**	-5.73**	7.2**	21.83**	10.18*	-3.01	-8.21*	-4.03
17	BDN 711 X BSMR 853	-3.32	-11.27**	-5.03	5	8.42**	-3.37	8.23**	23**	6.98	-7.31	-8.96*	-4.82
18	BDN 711 X ICPL 87	10.51**	3.37	-7.54*	2.22	19.61**	8.61**	-4.8	8.19**	12.25*	-3.7	-30.69**	-27.53**
19	BDN 711 X BDN 2014-1	-16.52**	-24.26**	-16.83**	-8.06*	4.05	-9.89**	7.89**	22.61**	34.72**	29.41**	-6.86	-2.61
20	BDN 711 X CRG 2015-007	-13.22**	-17.3**	-18.34**	-9.72**	11.71**	3.51	6.35*	20.86**	15.61**	-5.27	6.73	11.59**
21	BDN 711 X BAUPP 15-22	5.53	1.56	-1.76	8.61*	3.26	-3.88	-2.23	11.11**	-2.11	-16.91**	-14.28**	-10.38
22	BDN 711 X NPMK 15-05	2.32	-5.48	-0.25	10.28**	5.89**	-2.63	1.72	15.59**	17.4**	2.66	-1.33	3.17
23	BDN 711 X BDN 2013-41	1.61	-8.91**	2.76	13.61**	7.23**	-4.3	6.86**	21.44**	18.92**	4.37	-0.53	4
24	BDN 711 X WRG 303	7.54**	-2.73	7.54	18.89**	8.07**	-2.96	6.86**	21.44**	3.89	-15.89**	-2.25	2.21
25	BDN 711 X NPEK 15-25	0.5	-9.28**	0.75	11.39**	-1.81	-15.42**	2.57	16.57**	7.24	-10.41**	-3.89	0.49
26	BDN 711 X ICPL 80338	-4.82	-16.85**	-25.63**	-17.78**	-3.17	-16.24**	-26.59**	-16.57**	0.79	-27.57**	-47.86**	-45.49**
27	BDN 711 X ICPL 20338	-4.72	-17.7**	-26.38**	-18.61**	-3.76	-17.42**	-27.62**	-17.74**	13.31	-20.43**	-42.73**	-40.12**

28	BDN 711 X ICPL 161	8.3**	4.49	-6.53*	3.33	-6.61*	-12.92**	-23.67**	-13.26**	25.26**	20.9**	-12.98**	-9.02*
29	BDN 711 X ICPL 88039	-4.39	-11.24**	-20.6**	-12.22**	3.05	-7.44**	-18.87**	-7.8**	9.5	8.6	-21.83**	-18.27**
30	BDN 711 X PU 881	-8.32**	-14.89**	-23.87**	-15.83**	3.26	-7.05*	-18.52**	-7.41**	17.45**	13.05*	-18.63**	-14.92**
31	AKT 8811 X BDN 2013-5	-2.94	-13.16**	-0.5	10**	2.72	-8.9**	3.6	17.74**	-2.99	-3.5	-7.7	-3.5
32	AKT 8811 X BSMR 853	-3.56	-11.03**	-4.77	5.28	-1.03	-11.64**	-1.03	12.48**	1.75	0.42	-1.37	3.13
33	AKT 8811 X ICPL 87	-3.58	-10.28**	-18.84**	-10.28**	17.2**	6.24*	-6.52**	6.24*	26.66**	-2.56	-6.81	-2.56
34	AKT 8811 X BDN 2014-1	-0.63	-9.38**	-0.5	10**	-2.73	-15.62**	1.03	14.81**	27.04**	7.55	2.86	7.55
35	AKT 8811 X CRG 2015-007	-2.52	-6.62*	-7.79*	1.94	4.14	-3.34	-0.69	12.87**	-0.78	-8.28*	3.34	8.05
36	AKT 8811 X BAUPP 15-22	-20.54**	-23.12**	-25.63**	-17.78**	0.36	-6.41**	-4.8	8.19**	6.54	2.66	5.9	10.73*
37	AKT 8811 X NPMK 15-05	-10.77**	-17.14**	-12.56**	-3.33	3.57	-4.6	-0.34	13.26**	-3.27	-3.5	-7.25	-3.03
38	AKT 8811 X BDN 2013-41	-5.81*	-15.14**	-4.27	5.83	-6.01**	-15.98**	-6.17*	6.63*	-15.53**	-15.68**	-19.35**	-15.68**
39	AKT 8811 X WRG 303	-0.5	-9.55**	0	10.56**	5.28*	-5.3*	4.29	18.52**	-2.23	-10.89**	3.57	8.29
40	AKT 8811 X NPEK 15-25	-4.99	-13.8**	-4.27	5.83	0	-13.72**	4.63	18.91**	-5.54	-10.66**	-4.16	0.2
41	AKT 8811 X ICPL 80338	-11.18**	-22.78**	-30.15**	-22.78**	-2.93	-16.18**	-26.24**	-16.18**	14.23*	-24.08**	-27.39**	-24.08**
42	AKT 8811 X ICPL 20338	-6.3	-19.44**	-27.14**	-19.44**	-2.16	-16.18**	-26.24**	-16.18**	5.73	-31.04**	-34.05**	-31.04**
43	AKT 8811 X ICPL 161	5.07	0.83	-8.79**	0.83	15.6**	7.6**	-5.32*	7.6**	14.84**	-2.38	-6.64	-2.38
44	AKT 8811 X ICPL 88039	-8.57**	-15.56**	-23.62**	-15.56**	8.48**	-2.73	-14.41**	-2.73	2.48	-10.83*	-14.71**	-10.83*
45	AKT 8811 X PU 881	-4.06	-11.39**	-19.85**	-11.39**	4.34	-6.24*	-17.5**	-6.24*	8.41	-8.05	-12.06**	-8.05
46	PKV TARA X BDN 2013-5	0.23	-6.14*	7.54*	18.89**	0.48	-5.58*	7.38**	22.03**	6.59	3.73	3.73	8.46
47	PKV TARA X BSMR 853	-1.21	-4.46	2.26	13.06**	0.97	-4.44*	7.03**	21.64**	10.86**	9.87*	9.87*	14.88**
48	PKV TARA X ICPL 87	7.91**	-4.02	-4.02	6.11	10.6**	-5.15*	-5.15*	7.8**	30.95**	-0.8	-0.8	3.72
49	PKV TARA X BDN 2014-1	5.39*	0.69	10.55**	22.22**	-2.58	-10.6**	7.03**	21.64**	22.78**	2.09	2.09	6.74
50	PKV TARA X CRG 2015-007	6.7*	6.03	6.03	17.22**	1.86	0.5	3.26	17.35**	1.25	-4.44	7.66	12.56**
51	PKV TARA X BAUPP 15-22	3.45	1.76	1.76	12.5**	-0.17	-1.01	0.69	14.42**	-4.6	-6.06	-3.09	1.32
52	PKV TARA X NPMK 15-05	-3.18	-5.71	-0.5	10**	1.34	-0.82	3.6	17.74**	7.11	5.03	5.03	9.81*
53	PKV TARA X BDN 2013-41	2.48	-3.34	9.05**	20.56**	0	-5.22*	5.83*	20.27**	5.28	2.81	2.81	7.5
54	PKV TARA X WRG 303	1.91	-2.95	7.29*	18.61**	2.2	-2.49	7.38**	22.03**	0.43	-6.58	8.58*	13.52**
55	PKV TARA X NPEK 15-25	-3.1	-7.92**	2.26	13.06**	-9.15**	-17.11**	0.51	14.23**	-7.18*	-10.32**	-3.81	0.58
56	PKV TARA X ICPL 80338	-15.66**	-29.65**	-29.65**	-22.22**	-3.77	-21.1**	-21.1**	-10.33**	27.76**	-16.01**	-16.01**	-12.18**
57	PKV TARA X ICPL 20338	-7.15*	-23.37**	-23.37**	-15.28**	-3.9	-21.78**	-21.78**	-11.11**	29.21**	-16.59**	-16.59**	-12.79**
58	PKV TARA X ICPL 161	-4.53	-12.56**	-12.56**	-3.33	4	-8.58**	-8.58**	3.9	12.13**	-6.39	-6.39	-2.13
59	PKV TARA X ICPL 88039	-1.56	-13.07**	-13.07**	-3.89	-6.87**	-20.93**	-20.93**	-10.14**	-5.42	-19.22**	-19.22**	-15.54**
60	PKV TARA X PU 881	-12.66**	-22.86**	-22.86**	-14.72**	-7.86**	-21.61**	-21.61**	-10.92**	-2.07	-18.43**	-18.43**	-14.71**
61	Rajeshwari X BDN 2013-5	-2.86	-10.75**	2.26	13.06**	4.11*	-4.37*	8.75**	23.59**	-6.88	-8.16	-10.63*	-6.56
62	Rajeshwari X BSMR 853	5.2*	-0.23	6.78*	18.06**	5.96**	-1.99	9.78**	24.76**	-3.47	-3.92	-5.63	-1.33
63	Rajeshwari X ICPL 87	-0.29	-9.69**	-13.32**	-4.17	9.88**	-3.78	-8.4**	4.09	8.03	-17.39**	-19.61**	-15.95**
64	Rajeshwari X BDN 2014-1	-0.85	-7.09*	2.01	12.78**	-3.43	-13.32**	3.77	17.93**	10.74*	-6.9	-9.4*	-5.28
65	Rajeshwari X CRG 2015-007	-23.1**	-24.17**	-25.13**	-17.22**	0.52	-3.17	-0.51	13.06**	-7.55*	-13.85**	-2.94	1.48
66	Rajeshwari X BAUPP 15-22	-2.48	-2.86	-6.03	3.89	-8.01**	-10.96**	-9.43**	2.92	-4.42	-7.13	-4.19	0.18
67	Rajeshwari X NPMK 15-05	-5.24*	-9.52**	-4.52	5.56	-0.52	-4.93*	-0.69	12.87**	0.01	-0.6	-3.27	1.13
68	Rajeshwari X BDN 2013-41	4.93	-2.9	9.55**	21.11**	-5.97**	-12.9**	-2.74	10.53**	-3.34	-4.34	-6.91	-2.66
69	Rajeshwari X WRG 303	3.16	-3.64	6.53*	17.78**	2.92	-4.05	5.66*	20.08**	8.66*	-0.18	16.01**	21.3**
70	Rajeshwari X NPEK 15-25	3.4	-3.62	7.04*	18.33**	-1.27	-11.88**	6.86**	21.44**	9.87**	4.77	12.38**	17.5**
71	Rajeshwari X ICPL 80338	-9.88**	-23.56**	-26.63**	-18.89**	0.65	-15.86**	-19.9**	-8.97**	26.65**	-16.19**	-18.44**	-14.73**
72	Rajeshwari X ICPL 20338	-5.15	-20.42**	-23.62**	-15.56**	2.06	-15.32**	-19.38**	-8.38**	25.92**	-18.2**	-20.4**	-16.77**
73	Rajeshwari X ICPL 161	6.03*	-1.05	-5.03	5	7.92**	-3.06	-7.72**	4.87	14.55**	-3.32	-5.92	-1.63
74	Rajeshwari X ICPL 88039	6.84*	-3.93	-7.79*	1.94	-1.25	-14.41**	-18.52**	-7.41**	7.71	-6.96	-9.46*	-5.34
75	Rajeshwari X PU 881	-4.8	-14.4**	-17.84**	-9.17**	-2.7	-15.5**	-19.55**	-8.58**	-0.49	-16.2**	-18.45**	-14.73**
76	Asha X BDN 2013-5	3.2	-0.88	13.57**	25.56**	3.46	1.36	15.27**	30.99**	-0.5	-1.92	-4.45	-0.09
77	Asha X BSMR 853	-0.47	-1.17	5.78	16.94**	-3.03	-4.29	7.2**	21.83**	-4.66	-5.05	-6.74	-2.49
78	Asha X ICPL 87	6.58*	-7.38*	-2.26	8.06*	6.55**	-11.79**	-3.77	9.36**	7.01	-18.2**	-20.31**	-16.67**
79	Asha X BDN 2014-1	3.15	1.14	11.06**	22.78**	-0.75	-5.16*	13.55**	29.04**	22.62**	3.04	0.38	4.95
80	Asha X CRG 2015-007	0.12	-3.1	2.26	13.06**	-5.91**	-8.65**	-0.34	13.26**	4.84	-2.25	10.13*	15.15**
81	Asha X BAUPP 15-22	-5.09	-9.05**	-4.02	6.11	-8.71**	-11.79**	-3.77	9.36**	3.11	0.24	3.41	8.12
82	Asha X NPMK 15-05	0.48	0.48	6.03	17.22**	-0.24	-2.36	6.52**	21.05**	4.18	3.48	0.81	5.4
83	Asha X BDN 2013-41	1.27	-2	10.55**	22.22**	-2.56	-3.69	7.55**	22.22**	4.23	3.1	0.44	5.02
84	Asha X WRG 303	-1.86	-4.09	6.03	17.22**	-6.73**	-7.17**	2.23	16.18**	-2.9	-10.75**	3.72	8.45
85	Asha X NPEK 15-25	-0.93	-3.39	7.29*	18.61**	-10.5**	-14.99**	3.09	17.15**	-0.28	-4.85	2.06	6.71
86	Asha X ICPL 80338	-1.75	-19.76**	-15.33**	-6.39	-7.43**	-26.57**	-19.9**	-8.97**	24.6**	-17.57**	-19.69**	-16.03**
87	Asha X ICPL 20338	-1.03	-20**	-15.58**	-6.67	-6.99**	-26.73**	-20.07**	-9.16**	32.51**	-13.94**	-16.16**	-12.34**
88	Asha X ICPL 161	-0.67	-11.19**	-6.28*	3.61	0	-15.25**	-7.55**	5.07	-2.34	-17.61**	-19.74**	-16.08**
89	Asha X ICPL 88039	3.72	-10.48**	-5.53	4.44	-2.21	-19.81**	-12.52**	-0.58	-10.43*	-22.66**	-24.66**	-21.22**
90	Asha X PU 881	-5.93*	-18.81**	-14.32**	-5.28	-6.79**	-23.43**	-16.47**	-5.07	-1.81	-17.35**	-19.48**	-15.81**
	SE±	3.51	4.05	4.05		4.2	4.85	4.85		9.08	10.49	10.49	
	CD at 5%	6.93	8	8		8.29	9.57	9.57		17.92	20.7	20.7	
	CD at 1%	9.14	10.56	10.56		10.94	12.63	12.63		23.65	27.31	27.31	
	Range Maxi.	12.44	12.15	13.57	25.56	19.61	8.61	15.27	30.99	34.72	29.41	16.01	21.3
	Range Mini.	-23.1	-29.65	-30.15	-22.78	-10.5	-26.73	-27.62	-17.74	-15.53	-31.04	-47.86	-45.49

SN	Crosses	4. No. of Primary branches/plant				5. No. of Secondary branches/plant				6. No. of pods/plant			
		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)	
				PKV TARA	AKT 8811			PKV TARA	AKT 8811			PKV TARA	AKT 8811
1	BSMR 736*BDN 2013-5	93.51**	61.26**	75.49**	148.61**	6.46	1.11	2.55	23.29**	31.2**	14.38*	20.41**	32.82**
2	BSMR 736*BSMR 853	77.54**	49.55**	62.75**	130.56**	23.59**	9.97**	43.07**	72.01**	94.29**	83.85**	61.24**	77.85**
3	BSMR 736*ICPL 87	120.25**	56.76**	70.59**	141.67**	59.15**	7.65	9.18*	31.27**	74.17**	48.33**	16.1*	28.07**
4	BSMR 736*BDN 2014-1	166.67**	76.58**	92.16**	172.22**	80.14**	46.26**	48.34**	78.35**	47.1**	30.19**	32.33**	45.97**
5	BSMR 736*CRG 2015-007	73.53**	59.46**	73.53**	145.83**	12**	7.76*	18.23**	42.15**	136.48**	118.92**	101.25**	121.98**
6	BSMR 736*BAUPP 15-22	122.89**	66.67**	81.37**	156.94**	45.74**	28.04**	29.86**	56.13**	58.01**	24.24*	-2.75	7.27
7	BSMR 736*NPMK 15-05	95.03**	41.44**	53.92**	118.06**	63.96**	37.91**	39.87**	68.16**	51.79**	38.47**	8.39	19.56*
8	BSMR 736*BDN 2013-41	86.8**	65.77**	80.39**	155.56**	24.32**	24.03**	25.79**	51.24**	85.85**	74.91**	36.91**	51.02**
9	BSMR 736*WRG 303	93.75**	67.57**	82.35**	158.33**	-17.35**	-35.03**	15.17**	38.46**	133.43**	99.12**	120.77**	143.52**
10	BSMR 736*NPEK 15-25	116.46**	54.05**	67.65**	137.5**	77.43**	21.05**	22.77**	47.61**	7.77	-1.63	-23**	-15.06
11	BSMR 736*ICPL 80338	12.5**	-4.97**	50**	112.5**	-7.24	-5.92	0	0	29.3**	-0.41	-22.04**	-14.01
12	BSMR 736*ICPL 20338	29.01**	11.92**	65.69**	134.72**	-10.19*	-8.91*	0	0	70.98**	32.47**	3.69	14.38
13	BSMR 736*ICPL 161	52.38**	29.73**	41.18**	100**	75.64**	35.42**	37.35**	65.13**	127.68**	93.11**	51.16**	66.74**
14	BSMR 736*ICPL 88039	37.63**	15.32**	25.49**	77.78**	91.67**	42.18**	44.21**	73.38**	269.63**	199.33**	134.3**	158.45**
15	BSMR 736*PU 881	-46.28**	-50.38**	-36.27**	-9.72*	-39.37**	-38.51**	0	0	31.88**	0.18	-21.58**	-13.5
16	BDN 711*BDN 2013-5	20**	13.51**	-17.65**	16.67**	10.77*	-4.94	-13.27**	4.27	0.47	-15.42*	-10.96	-1.78
17	BDN 711*BSMR 853	30.99**	22.37**	-8.82**	29.17**	-25.08**	-43.72**	-26.78**	-11.97*	144.4**	122.49**	95.13**	115.23**
18	BDN 711*ICPL 87	15.04**	-1.52	-36.27**	-9.72*	36.35**	5.49	-31.04**	-17.09**	103.34**	79.43**	29.15**	42.46**
19	BDN 711*BDN 2014-1	37.25**	6.06	-31.37**	-2.78	201.37**	196.54**	93.84**	133.05**	79.99**	53.72**	56.25**	72.35**
20	BDN 711*CRG 2015-007	-30.82**	-40.86**	-46.08**	-23.61**	79.74**	43.41**	57.35**	89.17**	126.97**	102.34**	86**	105.17**
21	BDN 711*BAUPP 15-22	-10.74*	-18.18**	-47.06**	-25**	90.38**	76.23**	35.31**	62.68**	281.42**	209.45**	122.73**	145.68**
22	BDN 711*NPMK 15-05	22.41**	7.58	-30.39**	-1.39	87.02**	81.85**	25.83**	51.28**	95.42**	85.32**	33.39**	47.13**
23	BDN 711*BDN 2013-41	-31.58**	-39.53**	-49.02**	-27.78**	-10.52*	-26.29**	-25.59**	-10.54*	16.09	13.74	-18.13*	-9.7
24	BDN 711*WRG 303	-17.01**	-24.69**	-40.2**	-15.28**	0.49	-31.22**	21.91**	46.57**	39.45**	14.99*	27.49**	40.63**
25	BDN 711*NPEK 15-25	34.51**	15.15**	-25.49**	5.56	93.12**	51.17**	-1.18	18.8**	133.74**	121.81**	59.65**	76.1**
26	BDN 711*ICPL 80338	1.32	-28.57**	12.75**	59.72**	-100**	-100**	0	0	-21.69	-37.83**	-55.26**	-50.64**
27	BDN 711*ICPL 20338	-0.46	-28.48**	5.88*	50**	-100**	-100**	0	0	-3.55	-22.96*	-44.55**	-38.83**
28	BDN 711*ICPL 161	-9.72**	-16.67**	-36.27**	-9.72*	91**	75.82**	14.93**	38.18**	104.1**	79.33**	29.07**	42.37**
29	BDN 711*ICPL 88039	71.63**	61.33**	18.63**	68.06**	62.78**	42.47**	-6.87	11.97*	79.45**	50.19**	8.1	19.24*
30	BDN 711*PU 881	-31.98**	-48.85**	-34.31**	-6.94	59.51**	4.27	0	0	232.32**	160**	87.13**	106.42**
31	AKT 8811*BDN 2013-5	-19.18**	-20.27**	-42.16**	-18.06**	-43.75**	-46.23**	-50.95**	-41.03**	20.83**	12.44	18.38*	30.58**
32	AKT 8811*BSMR 853	-5.41	-7.89*	-31.37**	-2.78	-33.22**	-45.26**	-28.79**	-14.39**	17.39*	15.48	4.69	15.48
33	AKT 8811*ICPL 87	269.75**	205.56**	115.69**	205.56**	74.8**	25**	3.97	25**	78.79**	43.68**	30.25**	43.68**
34	AKT 8811*BDN 2014-1	151.85**	88.89**	33.33**	88.89**	102.69**	78.43**	48.41**	78.43**	24.53**	17.79*	19.73*	32.07**
35	AKT 8811*CRG 2015-007	-21.21**	-30.11**	-36.27**	-9.72*	20.15**	5.62	15.88**	39.32**	30.07**	29.17**	18.74*	30.98**
36	AKT 8811*BAUPP 15-22	22.83**	8.33*	-23.53**	8.33*	45.78**	40.17**	16.59**	40.17**	151.4**	87.84**	70.29**	87.84**
37	AKT 8811*NPMK 15-05	40.98**	19.44**	-15.69**	19.44**	69.83**	55.56**	29.38**	55.56**	102.25**	73.11**	56.94**	73.11**
38	AKT 8811*BDN 2013-41	12.66**	3.49	-12.75**	23.61**	6.05	-3.29	-2.37	17.38**	60.55**	41.42**	28.21**	41.42**
39	AKT 8811*WRG 303	43.79**	35.8**	7.84**	52.78**	26.66**	-6.95**	64.93**	98.29**	108.87**	89.82**	110.47**	132.16**
40	AKT 8811*NPEK 15-25	135.29**	94.44**	37.25**	94.44**	88.44**	36.1**	13.2**	36.1**	60.26**	37.25**	24.43**	37.25**
41	AKT 8811*ICPL 80338	43.35**	3.73*	63.73**	131.94**	-100**	-100**	0	0	-36.71**	-53.59**	-57.93**	-53.59**
42	AKT 8811*ICPL 20338	-17.49**	-39.07**	-9.8**	27.78**	-100**	-100**	0	0	-24.4*	-44.26**	-49.47**	-44.26**
43	AKT 8811*ICPL 161	66.67**	60.26**	22.55**	73.61**	41.68**	17.66**	-2.13	17.66**	78.83**	43.17**	29.79**	43.17**
44	AKT 8811*ICPL 88039	25.17**	22.67**	-9.8**	27.78**	30.11**	3.42	-13.98**	3.42	46.31**	12.29	1.8	12.29
45	AKT 8811*PU 881	-33**	-48.09**	-33.33**	-5.56	-18.8**	-32.46**	0	0	19.34	-13.58	-21.65**	-13.58
46	PKV TARA*BDN 2013-5	29.55**	11.76**	11.76**	58.33**	19.21**	13.98**	13.98**	37.04**	7.27	4.58	10.1	21.45*
47	PKV TARA*BSMR 853	41.57**	23.53**	23.53**	75**	24.61**	10.2**	43.36**	72.36**	39.35**	30.78**	30.78**	44.26**
48	PKV TARA*ICPL 87	42.28**	3.92	3.92	47.22**	121.4**	50.31**	50.31**	80.71**	145.83**	90.58**	90.58**	110.22**
49	PKV TARA*BDN 2014-1	110.14**	42.16**	42.16**	101.39**	89.22**	54.47**	54.47**	85.71**	-19.72**	-20.37**	-19.06*	-10.71
50	PKV TARA*CRG 2015-007	-17.95**	-21.57**	-21.57**	11.11**	42.6**	36.29**	49.53**	79.77**	0.39	-3.66	-3.66	6.27
51	PKV TARA*BAUPP 15-22	-3.18	-25.49**	-25.49**	5.56	29.91**	14.82**	14.82**	38.05**	36.74**	-0.99	-0.99	9.21
52	PKV TARA*NPMK 15-05	-17.11**	-38.24**	-38.24**	-12.5**	27.87**	8.18	8.18	30.06**	53.68**	26.43**	26.43**	39.46**
53	PKV TARA*BDN 2013-41	-34.04**	-39.22**	-39.22**	-13.89**	23.36**	22.78**	23.95**	49.02**	25.81**	6.35	6.35	17.3*
54	PKV TARA*WRG 303	-13.66**	-22.55**	-22.55**	9.72*	5.3*	-17.65**	45.97**	75.5**	13.16*	7.61	19.32*	31.61**
55	PKV TARA*NPEK 15-25	-8.72*	-33.33**	-33.33**	-5.56	79.58**	22.99**	22.99**	47.86**	38.95**	14.38	14.38	26.16**
56	PKV TARA*ICPL 80338	-33.84**	-45.96**	-14.71**	20.83**	-43.6**	-43.6**	0	0	13.24	-19.43*	-19.43*	-11.12
57	PKV TARA*ICPL 20338	-12.25**	-26.49**	8.82**	54.17**	17.1**	17.1**	0	0	29.61**	-7.32	-7.32	2.23
58	PKV TARA*ICPL 161	-5.56*	-16.67**	-16.67**	18.06**	20.58**	-6.56	-6.56	12.34**	57.84**	21.94**	21.94**	34.5**
59	PKV TARA*ICPL 88039	-17.51**	-28.43**	-28.43**	1.39	7.09	-20.19**	-20.19**	-4.05	-6.26	-30.4**	-30.4**	-23.22**
60	PKV TARA*PU 881	-9.87**	-19.85**	2.94	45.83**	-17.3**	-17.3**	0	0	4.63	-26.42**	-26.42**	-18.84*
61	Rajeshwari*BDN 2013-5	3.03	-8.11*	-33.33**	-5.56	7.8	4.16	-4.98	14.25**	-27.82**	-35.5**	-32.1**	-25.1**
62	Rajeshwari*BSMR 853	49.25**	31.58**	-1.96	38.89**	-19.93**	-33.79**	-13.86**	3.56	16.63*	13.43	-0.52	9.73
63	Rajeshwari*ICPL 87	96.19**	77.59**	0.98	43.06**	135.69**	67.41**	42.42**	71.23**	95.51**	62.68**	34.84**	48.73**
64	Rajeshwari*BDN 2014-1	57.45**	27.59**	-27.45**	2.78	45.72**	27.05**	8.08	29.94**	7.17	-2.72	-1.12	9.07
65	Rajeshwari*CRG 2015-007	20.53**	-2.15	-10.78**	26.39**	-3.89	-14.69**	-6.4	12.54*	-31.62**	-34.98**	-40.23**	-34.07**
66	Rajeshwari*BAUPP 15-22	20.35**	17.24**	-33.33**	-5.56	16.25**	10.58*	-5.92	13.11*	91.28**	47.35**	22.13**	34.72**
67	Rajeshwari*NPMK 15-05	96.3**	82.76**	3.92	47.22**	66.82**	51.25**	28.67**	54.7**	52.55**	35.66**	12.45	24.03**
68	Rajeshwari*BDN 2013-41	-1.39	-17.44**	-30.39**	-1.39	30.45**	20.19**	21.33**	45.87**	55.43**	42.46**	18.08*	30.25**
69	Rajeshwari*WRG 303	-0.72	-14.81**	-32.35**	-4.17	-24.48**	-44.12**	-0.95	19.09**	-37.41**	-45.31**	-39.37**	-33.12**
70	Rajeshwari*NPEK 15-25	50.48**	36.21**	-22.55**	9.72*	138.93**	71.38**	45.79**	75.28**	83.75**	63.51**	35.53**	49.49**
71	Rajeshwari*ICPL 80338	-14.16**	-41.61**	-7.84**	30.56**	-25.63**	-36.73**	0	0	80.4**	36.23**	12.92	24.55**
72	Rajeshwari*ICPL 20338	15.79**	-19.87**	18.63**	68.06**	-60.72**	-66.59**	0	0	5.46	-19.9*	-33.61**	-26.77**

73	Rajeshwari*ICPL 161	60.29**	39.74**	6.86*	51.39**	13.13*	-6.88	-20.78**	-4.76	107.03**	71.58**	42.22**	56.87**
74	Rajeshwari*ICPL 88039	81.95**	61.33**	18.63**	68.06**	27.21**	0.28	-14.69**	2.56	13.29	-10.21	-25.58**	-17.91*
75	Rajeshwari*PU 881	54.5**	11.45**	43.14**	102.78**	-1.95	-16.59**	0	0	53.05**	14.05	-5.47	4.28
76	Asha*BDN 2013-5	25.64**	19.51**	-3.92	36.11**	20.49**	1.01	36.2**	63.75**	8	-1.61	3.58	14.25
77	Asha*BSMR 853	13.92**	9.76**	-11.76**	25**	-5.72*	-7.38*	24.88**	50.14**	5.1	4.4	-8.44	0.99
78	Asha*ICPL 87	75.19**	37.8**	10.78**	56.94**	44.44**	-8.61**	23.22**	48.15**	64.77**	34.79**	16.65*	28.67**
79	Asha*BDN 2014-1	62.71**	17.07**	-5.88*	33.33**	-6.94	-31.63**	-7.82	10.83*	-27.04**	-32.46**	-31.35**	-24.27**
80	Asha*CRG 2015-007	-4	-9.68**	-17.65**	16.67**	34.11**	21.62**	63.98**	97.15**	58.08**	53.45**	41.06**	55.6**
81	Asha*BAUPP 15-22	25.55**	4.88	-15.69**	19.44**	0.34	-21.27**	6.16	27.64**	62.06**	22.99**	6.43	17.4*
82	Asha*NPMK 15-05	18.18**	-4.88	-23.53**	8.33*	27.06**	-3.87	29.62**	55.84**	175.37**	140.37**	108.01**	129.45**
83	Asha*BDN 2013-41	-28.57**	-30.23**	-41.18**	-16.67**	28.64**	12.48**	51.66**	82.34**	66.88**	50.02**	29.83**	43.21**
84	Asha*WRG 303	-9.2**	-9.76**	-27.45**	2.78	-9.04**	-19.92**	41.94**	70.66**	27.7**	13.68*	26.05**	39.04**
85	Asha*NPEK 15-25	17.83**	-7.32*	-25.49**	5.56	50.07**	-4.39	28.91**	54.99**	83.3**	60.1**	38.55**	52.82**
86	Asha*ICPL 80338	-15.23**	-36.02**	0.98	43.06**	-40.07**	-19.19**	0	0	28.34**	-4.47	-17.33*	-8.81
87	Asha*ICPL 20338	3.86	-19.87**	18.63**	68.06**	-47.67**	-29.44**	0	0	39.49**	4.41	-9.64	-0.33
88	Asha*ICPL 161	23.75**	20.73**	-2.94	37.5**	41.91**	-0.11	34.68**	61.92**	62.22**	32.19**	14.4	26.19**
89	Asha*ICPL 88039	9.55**	4.88	-15.69**	19.44**	0.31	-31.6**	-7.77	10.88*	17.28	-8.49	-20.81**	-12.65
90	Asha*PU 881	16.43**	-5.34*	21.57**	72.22**	-100**	-100**	0	0	18.01	-13.28	-24.95**	-17.22*
	SE±	0.17	0.2	0.2		1.02	1.18	1.18		17.81	20.56	20.56	
	CD at 5%	0.33	0.38	0.38		2.02	2.33	2.33		35.14	40.58	40.58	
	CD at 1%	0.44	0.51	0.51		2.67	3.08	3.08		46.37	53.54	53.54	
	Range Maxi.	269.75	205.56	115.69	205.56	201.37	196.54	93.84	133.05	281.42	209.45	134.3	158.45
	Range Mini.	-46.28	-50.38	-49.02	-27.78	-100	-100	-50.95	-41.03	-37.41	-53.59	-57.93	-53.59

SN	Crosses	7. No. of Cluster/plant				8. No. of pod/cluster				9. No. of Seeds per pod			
		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)	
				PKV TARA	AKT 8811			PKV TARA	AKT 8811			PKV TARA	AKT 8811
1	BSMR 736*BDN 2013-5	91.47**	90.7**	59.61**	81.21**	-30.53**	-38.89**	-23.26**	-25**	5.34	-10.39**	25.45**	15**
2	BSMR 736*BSMR 853	47.6**	29.2*	42.9**	62.24**	33.33**	21.95**	16.28*	13.64*	19.27**	18.18**	18.18**	8.33*
3	BSMR 736*ICPL 87	43.11**	27.43	5.8	20.12	16.88*	9.76	4.65	2.27	23.08**	18.52**	16.36**	6.67
4	BSMR 736*BDN 2014-1	72.33**	45.29**	75.79**	99.58**	-17.95**	-21.95**	-25.58**	-27.27**	11.32**	9.26*	7.27	-1.67
5	BSMR 736*CRG 2015-007	110.76**	106.79**	71.7**	94.93**	7.69	-2	13.95*	11.36	-3.39	-10.94**	3.64	-5
6	BSMR 736*BAUPP 15-22	45.68**	24.76	3.59	17.61	10.81	0	-4.65	-6.82	9.57**	3.28	14.55**	5
7	BSMR 736*NPMK 15-05	50.43**	33.11*	10.52	25.47	0	-2.33	-2.33	-4.55	-17.39**	-32.14**	3.64	-5
8	BSMR 736*BDN 2013-41	127.67**	97.21**	63.74**	85.9**	-20**	-26.53**	-16.28*	-18.18**	18.64**	9.38*	27.27**	16.67**
9	BSMR 736*WRG 303	169.38**	153.07**	139.07**	171.43**	-9.89	-18**	-4.65	-6.82	13.79**	6.45	20**	10*
10	BSMR 736*NPEK 15-25	-33.82*	-36.43*	-47.22**	-40.08**	61.04**	51.22**	44.19**	40.91**	-18.4**	-28.17**	-7.27	-15**
11	BSMR 736*ICPL 80338	122.96**	79.29**	48.86**	69**	-40.26**	-43.9**	-46.51**	-47.73**	-7.84	-12.96**	-14.55**	-21.67**
12	BSMR 736*ICPL 20338	121.97**	74.25**	44.67**	64.25**	-20**	-21.95**	-25.58**	-27.27**	2	-5.56	-7.27	-15**
13	BSMR 736*ICPL 161	280.4**	257.82**	197.09**	237.3**	-39.73**	-46.34**	-48.84**	-50**	-5.56	-5.56	-7.27	-15**
14	BSMR 736*ICPL 88039	288.37**	221.93**	167.29**	203.47**	-3.8	-7.32	-11.63	-13.64*	-4.13	-13.43**	5.45	-3.33
15	BSMR 736*PU 881	53.16**	23.81	2.8	16.71	-14.67*	-21.95**	-25.58**	-27.27**	-27.12**	-32.81**	-21.82**	-28.33**
16	BDN 711*BDN 2013-5	29.57	13.36	-5.12	7.72	-22.33**	-25.93**	-6.98	-9.09	-14.07**	-24.68**	5.45	-3.33
17	BDN 711*BSMR 853	182.33**	121.26**	144.72**	177.84**	-18.07**	-30.61**	-20.93**	-22.73**	-0.88	-3.45	1.82	-6.67
18	BDN 711*ICPL 87	106.97**	103.66**	32.03*	49.9**	-1.18	-14.29*	-2.33	-4.55	7.41	0	5.45	-3.33
19	BDN 711*BDN 2014-1	205.27**	131.81**	180.46**	218.42**	-44.19**	-51.02**	-44.19**	-45.45**	1.82	-3.45	1.82	-6.67
20	BDN 711*CRG 2015-007	182.25**	151.96**	101.33**	128.58**	-21.21**	-22**	-9.3	-11.36	14.75**	9.38*	27.27**	16.67**
21	BDN 711*BAUPP 15-22	324.48**	312.39**	158.8**	193.83**	-9.76	-24.49**	-13.95*	-15.91*	7.56*	4.92	16.36**	6.67
22	BDN 711*NPMK 15-05	125.83**	123.8**	43.02**	62.38**	-13.04*	-18.37**	-6.98	-9.09	-12.68**	-26.19**	12.73**	3.33
23	BDN 711*BDN 2013-41	-9.37	-10.78	-44.01**	-36.43*	24.49**	24.49**	41.86**	38.64**	-3.28	-7.81*	7.27	-1.67
24	BDN 711*WRG 303	137**	97.23**	86.31**	111.53**	-41.41**	-42**	-32.56**	-34.09**	5	1.61	14.55**	5
25	BDN 711*NPEK 15-25	255.76**	223.87**	147.65**	181.17**	-34.12**	-42.86**	-34.88**	-36.36**	8.53**	-1.41	27.27**	16.67**
26	BDN 711*ICPL 80338	-13.7	-22.13	-51.13**	-44.51**	-8.24	-20.41**	-9.3	-11.36	0	-8.62*	-3.64	-11.67**
27	BDN 711*ICPL 20338	-3.75	-15.58	-47.02**	-39.85**	4.55	-6.12	6.98	4.55	7.69	-3.45	1.82	-6.67
28	BDN 711*ICPL 161	85.57**	72.36**	26.12*	43.19**	16.05*	-4.08	9.3	6.82	5.36	1.72	7.27	-1.67
29	BDN 711*ICPL 88039	101.74**	88.66**	18.4	34.42*	-10.34	-20.41**	-9.3	-11.36	-5.6	-11.94**	7.27	-1.67
30	BDN 711*PU 881	271.59**	237.41**	111.75**	140.41**	-6.02	-20.41**	-9.3	-11.36	0	-4.69	10.91*	1.67
31	AKT 8811*BDN 2013-5	44.11**	40.52**	23.77	40.52**	-16.33**	-24.07**	-4.65	-6.82	-10.95**	-20.78**	10.91*	1.67
32	AKT 8811*BSMR 853	13.93	2.33	13.18	28.49	0	-11.36	-9.3	-11.36	16.52**	11.67**	21.82**	11.67**
33	AKT 8811*ICPL 87	115.49**	87.04**	64.75**	87.04**	-15*	-22.73**	-20.93**	-22.73**	3.64	-5	3.64	-5
34	AKT 8811*BDN 2014-1	23.48*	6.69	29.08*	46.55**	1.23	-6.82	-4.65	-6.82	14.29**	6.67	16.36**	6.67
35	AKT 8811*CRG 2015-007	90.69**	81.84**	60.16**	81.84**	-25.53**	-30**	-18.6**	-20.45**	8.06*	4.69	21.82**	11.67**
36	AKT 8811*BAUPP 15-22	173.03**	128.24**	101.03**	128.24**	-3.9	-15.91*	-13.95*	-15.91*	12.4**	11.48**	23.64**	13.33**
37	AKT 8811*NPMK 15-05	198.39**	157.44**	126.75**	157.44**	-31.03**	-31.82**	-30.23**	-31.82**	-2.78	-16.67**	27.27**	16.67**
38	AKT 8811*BDN 2013-41	89.51**	60.17**	41.08**	60.17**	-16.13**	-20.41**	-9.3	-11.36	19.35**	15.63**	34.55**	23.33**
39	AKT 8811*WRG 303	210.07**	199.58**	183.01**	221.31**	-31.91**	-36**	-25.58**	-27.27**	-1.64	-3.23	9.09*	0
40	AKT 8811*NPEK 15-25	112.09**	98.11**	74.49**	98.11**	-22.5**	-29.55**	-27.91**	-29.55**	2.29	-5.63	21.82**	11.67**
41	AKT 8811*ICPL 80338	-29.84	-44.81**	-51.39**	-44.81**	-7.5	-15.91*	-13.95*	-15.91*	5.56	-5	3.64	-5
42	AKT 8811*ICPL 20338	4.51	-19.67	-29.24*	-19.67	-25.3**	-29.55**	-27.91**	-29.55**	13.21**	0	9.09*	0
43	AKT 8811*ICPL 161	118.48**	99.99**	76.15**	99.99**	-2.63	-15.91*	-13.95*	-15.91*	3.51	-1.67	7.27	-1.67
44	AKT 8811*ICPL 88039	139.21**	93.78**	70.68**	93.78**	-36.59**	-40.91**	-39.53**	-40.91**	-8.66**	-13.43**	5.45	-3.33
45	AKT 8811*PU 881	80.5**	42.73**	25.71*	42.73**	-30.77**	-38.64**	-37.21**	-38.64**	-11.29**	-14.06**	0	-8.33*
46	PKV TARA*BDN 2013-5	39.92**	28.51*	28.51*	45.91**	-19.59**	-27.78**	-9.3	-11.36	-10.61**	-23.38**	7.27	-1.67
47	PKV TARA*BSMR 853	26.16*	20.12	32.85*	50.83**	11.69	0	0	-2.27	12.73**	12.73**	12.73**	3.33
48	PKV TARA*ICPL 87	199.39**	146.74**	146.74**	180.13**	-18.99**	-25.58**	-25.58**	-27.27**	25.71**	20**	20**	10*

49	PKV TARA*BDN 2014-1	-20.85*	-27.72*	-12.55	-0.71	2.5	-4.65	-4.65	-6.82	28.97**	25.45**	25.45**	15**
50	PKV TARA*CRG 2015-007	10.4	-0.69	-0.69	12.75	-11.83*	-18**	-4.65	-6.82	9.24**	1.56	18.18**	8.33*
51	PKV TARA*BAUPP 15-22	29.81*	3.32	3.32	17.3	7.89	-4.65	-4.65	-6.82	1.72	-3.28	7.27	-1.67
52	PKV TARA*NPMK 15-05	38.08**	13.16	13.16	28.48	13.95*	13.95*	13.95*	11.36	-7.91**	-23.81**	16.36**	6.67
53	PKV TARA*BDN 2013-41	47.18**	18.34	18.34	34.36*	-15.22**	-20.41**	-9.3	-11.36	2.52	-4.69	10.91*	1.67
54	PKV TARA*WRG 303	42.5**	38.55**	38.55**	57.31**	-22.58**	-28**	-16.28*	-18.18**	2.56	-3.23	9.09*	0
55	PKV TARA*NPEK 15-25	49.6**	31.99*	31.99*	49.86**	-3.8	-11.63	-11.63	-13.64*	-6.35	-16.9**	7.27	-1.67
56	PKV TARA*ICPL 80338	36.32*	2.58	2.58	16.46	-13.92*	-20.93**	-20.93**	-22.73**	2.91	-3.64	-3.64	-11.67**
57	PKV TARA*ICPL 20338	147.63**	82.42**	82.42**	107.11**	-46.34**	-48.84**	-48.84**	-50**	16.83**	7.27	7.27	-1.67
58	PKV TARA*ICPL 161	34.01**	16.04	16.04	31.74*	12	-2.33	-2.33	-4.55	6.42	5.45	5.45	-3.33
59	PKV TARA*ICPL 88039	48.23**	14.6	14.6	30.11*	-35.8**	-39.53**	-39.53**	-40.91**	-3.28	-11.94**	7.27	-1.67
60	PKV TARA*PU 881	47.84**	11.78	11.78	26.9	-27.27**	-34.88**	-34.88**	-36.36**	-9.24**	-15.62**	-1.82	-10*
61	Rajeshwari*BDN 2013-5	-10.24	-13.69	-21.75	-11.16	-20.43**	-31.48**	-13.95*	-15.91*	0	-11.69**	23.64**	13.33**
62	Rajeshwari*BSMR 853	40.35**	27.7*	41.24**	60.35**	-17.81*	-23.08**	-30.23**	-31.82**	3.51	0	7.27	-1.67
63	Rajeshwari*ICPL 87	111.34**	81.23**	64.3**	86.54**	-6.67	-10.26	-18.6**	-20.45**	11.93**	3.39	10.91*	1.67
64	Rajeshwari*BDN 2014-1	18.1	3.3	24.98	41.89**	-10.53	-12.82	-20.93**	-22.73**	22.52**	15.25**	23.64**	13.33**
65	Rajeshwari*CRG 2015-007	-18.74	-23.56	-30.7*	-21.32	-14.61*	-24**	-11.63	-13.64*	18.7**	14.06**	32.73**	21.67**
66	Rajeshwari*BAUPP 15-22	118.54**	80.61**	63.73**	85.89**	-11.11	-17.95*	-25.58**	-27.27**	-20**	-21.31**	-12.73**	-20**
67	Rajeshwari*NPMK 15-05	103.44**	73.42**	57.22**	78.5**	-24.39**	-27.91**	-27.91**	-29.55**	-4.9	-19.05**	23.64**	13.33**
68	Rajeshwari*BDN 2013-41	110.39**	75.76**	59.34**	80.91**	-27.27**	-34.69**	-25.58**	-27.27**	0.81	-3.12	12.73**	3.33
69	Rajeshwari*WRG 303	-15.45	-17.15	-21.74	-11.14	-25.84**	-34**	-23.26**	-25**	4.13	1.61	14.55**	5
70	Rajeshwari*NPEK 15-25	66.15**	53.14**	38.84**	57.63**	12	7.69	-2.33	-4.55	-9.23**	-16.9**	7.27	-1.67
71	Rajeshwari*ICPL 80338	152.39**	96.49**	78.13**	102.24**	-28**	-30.77**	-37.21**	-38.64**	8.41*	-1.69	5.45	-3.33
72	Rajeshwari*ICPL 20338	64.34**	25.06	13.38	28.73	-35.9**	-35.9**	-41.86**	-43.18**	10.48**	-1.69	5.45	-3.33
73	Rajeshwari*ICPL 161	132.19**	109.79**	90.19**	115.94**	-9.86	-17.95*	-25.58**	-27.27**	-11.5**	-15.25**	-9.09*	-16.67**
74	Rajeshwari*ICPL 88039	37.53*	10.19	-0.1	13.42	-16.88*	-17.95*	-25.58**	-27.27**	-12.7**	-17.91**	0	-8.33*
75	Rajeshwari*PU 881	128.09**	78.47**	61.79**	83.69**	-31.51**	-35.9	-41.86**	-43.18**	-4.07	-7.81*	7.27	-1.67
76	Asha*BDN 2013-5	64.02**	53.79**	47.06**	66.97**	-35.48**	-44.44**	-30.23**	-31.82**	-9.77**	-22.08**	9.09*	0
77	Asha*BSMR 853	17.4	9.45	21.06	37.44*	-9.59	-15.38*	-23.26**	-25**	-0.9	-1.79	0	-8.33*
78	Asha*ICPL 87	89.4**	58.9**	51.95**	72.51**	-12	-15.38*	-23.26**	-25**	15.09**	8.93*	10.91*	1.67
79	Asha*BDN 2014-1	-20.64*	-28.96**	-14.04	-2.41	-10.53	-12.82	-20.93**	-22.73**	14.81**	10.71*	12.73**	3.33
80	Asha*CRG 2015-007	114.71**	97.06**	88.44**	113.94**	-28.09**	-36**	-25.58**	-27.27**	1.67	-4.69	10.91*	1.67
81	Asha*BAUPP 15-22	44.7**	17.13	12	27.16	16.67*	7.69	-2.33	-4.55	-14.53**	-18.03**	-9.09*	-16.67**
82	Asha*NPMK 15-05	219.56**	166.56**	154.9**	189.39**	-14.63*	-18.6**	-18.6**	-20.45**	4.29	-13.1**	32.73**	21.67**
83	Asha*BDN 2013-41	50.05**	22.74	17.37	33.25*	11.36	0	13.95*	11.36	-6.67	-12.5**	1.82	-6.67
84	Asha*WRG 303	48.82**	47.92**	41.45**	60.59**	-14.61*	-24**	-11.63	-13.64*	5.08	0	12.73**	3.33
85	Asha*NPEK 15-25	110.67**	89.57**	81.28**	105.81**	-12	-15.38*	-23.26**	-25**	-10.24**	-19.72**	3.64	-5
86	Asha*ICPL 80338	94.1**	48.31**	41.82**	61.01**	-33.33**	-35.9**	-41.86**	-43.18**	-1.92	-8.93*	-7.27	-15**
87	Asha*ICPL 20338	53.84**	14.99	9.96	24.85	-10.26	-10.26	-18.6**	-20.45**	7.84	-1.79	0	-8.33*
88	Asha*ICPL 161	122.26**	96.17**	87.58**	112.97**	-26.76**	-33.33**	-39.53**	-40.91**	3.64	1.79	3.64	-5
89	Asha*ICPL 88039	32.61*	4.18	-0.38	13.1	-11.69	-12.82	-20.93**	-22.73**	-20.33**	-26.87**	-10.91*	-18.33**
90	Asha*PU 881	31.94*	1.3	-3.13	9.98	-9.59	-15.38*	-23.26**	-25**	-3.33	-9.37*	5.45	-3.33
	SE±		10.67	12.32	12.32	0.17	0.2	0.2		0.14	0.16	0.16	
	CD at 5%		21.05	24.31	24.31	0.33	0.39	0.39		0.27	0.31	0.31	
	CD at 1%		27.78	32.08	32.08	0.44	0.51	0.51		0.36	0.41	0.41	
	Range	Maxi.	324.48	312.39	197.09	237.3	61.04	51.22	44.19	40.91	28.97	25.45	34.55	23.33
		Mini.	-33.82	-44.81	-51.39	-44.81	-46.34	-51.02	-48.84	-50	-27.12	-32.81	-21.82	-28.33

SN	Crosses	10. 100 grain weight (g)				11. Harvest index (%)				12. Seed yield Plant^{-1} (g)			
		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)		MP (%)	BP (%)	SH (%)	
				PKV TARA	AKT 8811			PKV TARA	AKT 8811			PKV TARA	AKT 8811
1	BSMR 736*BDN 2013-5	-1.83	-16.55**	7.81**	10.36**	10.99	-1.08	-10.73*	3.2	75.91**	57.52**	64.32**	144.52**
2	BSMR 736*BSMR 853	-12.78**	-22.27**	-10.12**	-8**	9.43	3.37	-6.72	7.84	95.23**	82.89**	72.75**	157.06**
3	BSMR 736*ICPL 87	-2.05	-5.77*	-7.75**	-5.57*	22.53**	4.28	-5.89	8.8	81.48**	45.13**	19.75	78.19**
4	BSMR 736*BDN 2014-1	6.82**	-1.57	5.65*	8.14**	18.73**	10.45	-0.33	15.22*	68.95**	61.71**	45.93**	117.16**
5	BSMR 736*CRG 2015-007	-2.05	-12.93**	1.27	3.66	31.22**	28.06**	15.56**	33.6**	122.38**	98.55**	108.51**	210.28**
6	BSMR 736*BAUPP 15-22	-2.34	-3.27	-12.5**	-10.43**	10.27	-6.91	-15.99**	-2.88	50.19**	12.44	-7.22	38.06*
7	BSMR 736*NPMK 15-05	8.2**	0.33	6.23*	8.74**	1.77	-2.42	-11.94*	1.8	21.07	10.57	10.37	64.23**
8	BSMR 736*BDN 2013-41	-12.53**	-27.02**	-1.27	1.06	8.1	5.06	-5.19	9.61	72.33**	58.31**	56.01**	132.15**
9	BSMR 736*WRG 303	10.78**	9.51**	-0.93	1.41	42.55**	40.33**	26.64**	46.4**	174.94**	143.94**	159.88**	286.72**
10	BSMR 736*NPEK 15-25	11.65**	5.37*	7.4**	9.94**	2.4	-8.48	-17.41**	-4.52	-6.02	-8.9	-24.83*	11.85
11	BSMR 736*ICPL 80338	-18.55**	-21.72**	-23.2**	-21.39**	19.35**	1.95	-8	6.36	-6.49	-38.87**	-49.56**	-24.95
12	BSMR 736*ICPL 20338	-4.45	-7.18**	-10.95**	-8.84**	21.24**	0.35	-9.44	4.69	18.52	-23.3	-36.71**	-5.82
13	BSMR 736*ICPL 161	3.33	-4.87	-13.94**	-11.91**	14.86*	1.81	-8.12	6.22	18.26	-3.2	-20.13	18.85
14	BSMR 736*ICPL 88039	-11.4**	-14.79**	-16.52**	-14.55**	21.11**	8.75	-1.86	13.46*	151.26**	100.39**	65.34**	146.04**
15	BSMR 736*PU 881	41.24**	26.48**	14.42**	17.12**	5.92	-12.23*	-20.79**	-8.43	23.16	-21.12	-34.92**	-3.16
16	BDN 711*BDN 2013-5	-4.3*	-10.44**	15.7**	18.43**	30.13**	19.35**	1	16.77**	51.75**	24.36*	29.73*	93.04**
17	BDN 711*BSMR 853	1.69	0.36	16.04**	18.78**	50.54**	46.65**	24.11**	43.48**	181.09**	139.73**	126.43**	236.95**
18	BDN 711*ICPL 87	-3.06	-9.39**	2.03	4.44	18.64**	3.74	-12.21*	1.5	129.07**	99.52**	32.99**	97.9**
19	BDN 711*BDN 2014-1	-2.61	-4.89*	7.09**	9.62**	34.38**	28.85**	9.04	26.06**	117.63**	89.19**	70.73**	154.05**
20	BDN 711*CRG 2015-007	-1.71	-3.28	12.5**	15.15**	32.09**	31.11**	12.62*	30.19**	198.99**	144.38**	156.64**	281.9**
21	BDN 711*BAUPP 15-22	-4.94*	-15.01**	-4.3	-2.04	48.43**	28.7**	8.92	25.91**	310.47**	231.59**	121.02**	228.89**
22	BDN 711*NPMK 15-05	-3.1	-5.99**	5.85*	8.35**	6.56	5.41	-10.79*	3.13	66.72**	39.03**	38.77**	106.49**
23	BDN 711*BDN 2013-41	-5.71**	-13.61**	16.87**	19.63**	-4.81	-5.12	-19.18**	-6.57	-31.19*	-42.32**	-43.16**	-15.42
24	BDN 711*WRG 303	7.04**	-4.46	7.57**	10.11**	17.56**	15.68*	1.14	16.93**	53.71**	24.94*	33.11**	98.07**

25	BDN 711*NPEK 15-25	-5.55**	-10.03**	1.31	3.7	38.42**	27.33**	7.76	24.58**	149.43**	132.03**	79.72**	167.44**
26	BDN 711*ICPL 80338	3.58	-3.09	9.12**	11.7**	3.24	-9.38	-23.31**	-11.34	-20.2	-44.91*	-63.28**	-45.36*
27	BDN 711*ICPL 20338	-16.01**	-22.23**	-12.43**	-10.36**	7.2	-8.94	-22.94**	-10.91	-12.15	-40.07*	-60.05**	-40.55*
28	BDN 711*ICPL 161	-5.65*	-20.94**	-10.98**	-8.88**	28.2**	16.93**	-1.05	14.4*	66.5**	48.91**	-0.74	47.7**
29	BDN 711*ICPL 88039	-9.86**	-15.71**	-5.09*	-2.85	15.66**	6.91	-9.52	4.6	48.58**	29.01	-14.01	27.96
30	BDN 711*PU 881	-11.33**	-27.48**	-18.35**	-16.42**	42.32**	21.04**	2.44	18.42**	67.32**	12.74	-24.85*	11.83
31	AKT 8811*BDN 2013-5	0.83	-11.46**	14.39**	17.09**	49.22**	35.51**	17.21**	35.51**	66.17**	36.83**	42.74**	112.41**
32	AKT 8811*BSMR 853	-6.5**	-13.75**	-0.28	2.08	22.18**	17.77**	1.87	17.77**	60.22**	37.34**	29.73*	93.04**
33	AKT 8811*ICPL 87	-8.34**	-8.44**	-10.36**	-8.25**	22.32**	5.97	-8.34	5.97	113.49**	84.98**	24.83*	85.76**
34	AKT 8811*BDN 2014-1	3.56	-1.09	6.16*	8.67**	19.71**	13.59*	-1.75	13.59*	85.94**	62.49**	46.63**	118.2**
35	AKT 8811*CRG 2015-007	-13.56**	-20.48**	-7.5**	-5.32*	1.02	0.67	-12.92*	0.67	36.25**	11.9	17.52	74.87**
36	AKT 8811*BAUPP 15-22	9.12**	4.12	1.72	4.12	41.89**	21.91**	5.45	21.91**	291.2**	214.55**	112.26**	215.86**
37	AKT 8811*NPMK 15-05	12.24**	7.9**	14.25**	16.95**	42.44**	39.41**	20.59**	39.41**	162.91**	120.32**	119.91**	227.25**
38	AKT 8811*BDN 2013-41	-15.51**	-27.25**	-1.58	0.74	23.18**	22.24**	5.74	22.24**	83.23**	54.35**	52.11**	126.35**
39	AKT 8811*WRG 303	7.14**	2.04	-0.31	2.04	10.78*	10.18	-3.66	11.37	133.9**	91.03**	103.52**	202.85**
40	AKT 8811*NPEK 15-25	-3.5	-5.5*	-3.68	-1.41	13.32*	3.21	-10.72*	3.21	97.03**	84.35**	42.79**	112.48**
41	AKT 8811*ICPL 80338	-4.01	-4.21	-6.02*	-3.81	-9.13	-20.98**	-31.65**	-20.98**	-24.47	-48.03**	-64.93**	-47.82**
42	AKT 8811*ICPL 20338	-4.53*	-5.39*	-7.57**	-5.39*	2.89	-13.38*	-25.07**	-13.38*	-15.33	-42.43*	-61.15**	-42.19*
43	AKT 8811*ICPL 161	3.98	-7.51**	-9.64**	-7.51**	8.33	-2.16	-15.37**	-2.16	107.22**	84.33**	24.39*	85.1**
44	AKT 8811*ICPL 88039	20.51**	20.34**	17.9**	20.68**	19.24**	9.13	-5.6	9.13	116.45**	86.97**	26.17*	87.75**
45	AKT 8811*PU 881	9.05**	-5.53*	-7.71**	-5.53*	11.43	-6.08	-18.76**	-6.08	48.31*	-0.38	-32.77**	0.04
46	PKV TARA*BDN 2013-5	1.95	-9.57**	16.83**	19.59**	13.13*	-3.5	-3.5	11.57	31.19**	28.52*	34.07**	99.51**
47	PKV TARA*BSMR 853	-4.6*	-11.04**	2.86	5.29*	12.24*	1.16	1.16	16.94**	22.03*	18.61	18.69	76.63**
48	PKV TARA*ICPL 87	6.87**	5.75*	5.75*	8.25**	35.38**	10.58	10.58	27.84**	203.82**	126.99**	127.15**	238.02**
49	PKV TARA*BDN 2014-1	11.87**	8.05**	15.97**	18.71**	1.94	-9.45	-9.45	4.68	23.19*	17.14	17.22	74.44**
50	PKV TARA*CRG 2015-007	0.16	-6.87**	8.33**	10.89**	-5.09	-11.78*	-11.78*	1.99	24.46*	21.53	27.63*	89.92**
51	PKV TARA*BAUPP 15-22	5.45*	-0.48	-0.48	1.87	1.97	-17.34**	-17.34**	-4.44	54.3**	8.79	8.87	62**
52	PKV TARA*NPMK 15-05	-5.2*	-7.83**	-2.41	-0.11	11.96*	2.34	2.34	18.31**	48.22**	48.03**	48.14**	120.44**
53	PKV TARA*BDN 2013-41	-9.67**	-21.45**	6.27*	8.77**	16.97**	8.3	8.3	25.2**	30.67**	29.68*	29.77*	93.11**
54	PKV TARA*WRG 303	4.37	-1.69	-1.69	0.63	4.94	-1.65	-1.65	13.7*	27.36**	23.5*	31.57**	95.78**
55	PKV TARA*NPEK 15-25	-3.34	-4.26	-2.41	-0.11	12.85*	-3.47	-3.47	11.6	38.57**	22.92	23	83.04**
56	PKV TARA*ICPL 80338	-11.8**	-12.63**	-12.63**	-10.57**	-5.57	-22.6**	-22.6**	-10.52	3.78	-34.96**	-34.91**	-3.14
57	PKV TARA*ICPL 20338	-11.91**	-13.7**	-13.7**	-11.66**	10.85	-11.79*	-11.79*	1.97	42.25*	-11.62	-11.55	31.62
58	PKV TARA*ICPL 161	-0.66	-12.53**	-12.53**	-10.47**	13.03*	-4.07	-4.07	10.9	47.38**	12.4	12.48	67.38**
59	PKV TARA*ICPL 88039	-15.88**	-16.73**	-16.73**	-14.76**	-11.01*	-23.54**	-23.54**	-11.61	-12.72	-34.95**	-34.91**	-3.13
60	PKV TARA*PU 881	8.95**	-6.54*	-6.54*	-4.33	-2.85	-22.61**	-22.61**	-10.53	8.52	-33.18**	-33.13**	-0.49
61	Rajeshwari*BDN 2013-5	1.11	-8.63**	18.04**	20.82**	2.72	-10.19	-15.3**	-2.08	-24.87*	-33.88**	-31.03**	2.63
62	Rajeshwari*BSMR 853	0.92	-4.02	10.98**	13.6**	19.51**	10.61	4.31	20.59**	24.87*	14.85	8.48	61.42**
63	Rajeshwari*ICPL 87	5.31*	2.08	6.47*	8.99**	29.29**	8.08	1.93	17.83**	127.32**	84.56**	46.33**	117.75**
64	Rajeshwari*BDN 2014-1	4.85*	3.37	10.95**	13.57**	5.36	-3.94	-9.41	4.72	55.17**	45.75**	31.53**	95.72**
65	Rajeshwari*CRG 2015-007	-2.32	-7.37**	7.75**	10.29**	-2.1	-6.46	-11.79*	1.97	10.29	-3.22	1.64	51.24**
66	Rajeshwari*BAUPP 15-22	0.89	-6.63**	-2.62	-0.32	4.86	-13.03*	-17.99**	-5.19	38.62*	5.18	-16.61	24.1
67	Rajeshwari*NPMK 15-05	-3.5	-4.23	1.41	3.81	13.99**	7.05	0.95	16.7**	61.8**	45.17**	44.89**	115.61**
68	Rajeshwari*BDN 2013-41	-11.35**	-21.5**	6.2*	8.7**	8.78	3.52	-2.38	12.85*	54.45**	39.36**	37.34**	104.36**
69	Rajeshwari*WRG 303	5.89*	-2.18	2.03	4.44	-7.91	-11.27	-16.32**	-3.26	-12.93	-24.07*	-19.11	20.37
70	Rajeshwari*NPEK 15-25	9.33**	8.09**	12.74**	15.4**	45.88**	27.91**	20.63**	39.45**	102.71**	100.37**	58.86**	136.4**
71	Rajeshwari*ICPL 80338	-0.37	-3.33	0.83	3.21	12.41*	-5.69	-11.06*	2.82	110.94**	39.22**	10.38	64.25**
72	Rajeshwari*ICPL 20338	-4.49*	-8.32**	-4.37	-2.11	-2.88	-20.98**	-25.49**	-13.86*	33.93	-12.52	-30.64*	3.21
73	Rajeshwari*ICPL 161	3.49	-10.5**	-6.64*	-4.44	15.51**	0.47	-5.26	9.53	91.43**	59.18**	26.21*	87.8**
74	Rajeshwari*ICPL 88039	-20.12**	-22.54**	-19.21**	-17.3**	-10.11	-20.82**	-25.33**	-13.68*	24.95	1.16	-19.79	19.35
75	Rajeshwari*PU 881	-14.31**	-27.76**	-24.65**	-22.87**	14.05*	-7.11	-12.4*	1.27	52.96**	-1.17	-21.64	16.61
76	Asha*BDN 2013-5	-27.55**	-31.25**	-11.19**	-9.09**	15.16**	-4.32	2.11	18.04**	-27.75**	-29.89**	-22.26	15.68
77	Asha*BSMR 853	-10.08**	-10.21**	4.13	6.59*	-2.54	-14.62**	-8.89	5.33	-20.85*	-26.71*	-18.74	20.92
78	Asha*ICPL 87	1.34	-6.56**	8.36**	10.92**	21.15**	-3.46	3.03	19.11**	66.75**	20.57	33.68**	98.92**
79	Asha*BDN 2014-1	-18.95**	-21.96**	-9.5**	-7.36**	-3.61	-16.74**	-11.15*	2.72	-27.05**	-33.84**	-26.65*	9.16
80	Asha*CRG 2015-007	-7.41**	-7.55**	7.54**	10.08**	11.3*	0.44	7.18	23.91**	58.86**	54.66**	71.49**	155.18**
81	Asha*BAUPP 15-22	-10.21**	-20.75**	-8.09**	-5.92*	20.85**	-4.4	2.02	17.94**	18.82	-18.6	-9.75	34.3
82	Asha*NPMK 15-05	-8.61**	-12.59**	1.38	3.77	32.39**	17.56**	25.46**	45.04**	146.32**	134.03**	159.48**	286.13**
83	Asha*BDN 2013-41	-6.73**	-13.38**	17.18**	19.94**	17.96**	6.06	13.18*	30.85**	49.22**	40.92**	56.25**	132.51**
84	Asha*WRG 303	-3.39	-14.87**	-1.27	1.06	-5.8	-14.31**	-8.56	5.71	29.26**	26.73*	40.51**	109.09**
85	Asha*NPEK 15-25	3.32	-2.94	12.56**	15.22**	15.7**	-3.62	2.85	18.9**	64.24**	39.49**	54.66**	130.15**
86	Asha*ICPL 80338	-23.36**	-29.27**	-17.97**	-16.03**	-0.22	-20.22**	-14.86**	-1.57	-4.87	-41.55**	-35.2**	-3.57
87	Asha*ICPL 20338	-30.05**	-36.09**	-25.89**	-24.14**	-2.81	-24.47**	-19.4**	-6.82	2.95	-37.25**	-30.43*	3.53
88	Asha*ICPL 161	-1.68	-18.58**	-5.58*	-3.35	9.24	-9.68	-3.62	11.42	41.85**	4.55	15.93	72.51**
89	Asha*ICPL 88039	-6.26**	-13.54**	0.28	2.64	-11*	-25.54**	-20.54**	-8.15	-15.53	-39.06**	-32.43**	0.55
90	Asha*PU 881	-6.94**	-24.76**	-12.74**	-10.68**	7.16	-16.63**	-11.04*	2.85	6.44	-35.66**	-28.66*	6.16
	SE±	0.21	0.25	0.25		1.14	1.31	1.31		9.55	11.03	11.03	
	CD at 5%	0.42	0.49	0.49		2.24	2.59	2.59		18.85	21.76	21.76	
	CD at 1%	0.56	0.64	0.64		2.96	3.41	3.41		24.87	28.71	28.71	
	Range Maxi.	41.24	26.48	18.04	20.82	50.54	46.65	26.64	46.4	310.47	231.59	159.88	286.72
	Range Mini.	-30.05	-36.09	-25.89	-24.14	-11.01	-25.54	-31.65	-20.98	-31.19	-48.03	-64.93	-47.82

Conclusion

From this study we had identified the best five crosses selected on the basis of *parse* performance and heterocyst for seed yield per plant were BDN 711 x BAUPP 15-22, AKT 8811 x BAUPP 15-22, PKV TARA x ICPL 87, BDN 711 x CRG 2015-007 and BDN 711 x BSMR 853 which could be utilized for their large-scale testing and general adaptability and may be utilize for commercial exploitation.

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