Electronic Journal of Plant Breeding, 8(4): 1140-1147 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00166.1

Research Article

Heterosis for pod yield and its component traits in groundnut (*Arachis hypogaea* L.)

B.D. Waghmode[1*], A.B. Kore[2], V.C. Navhale[3], N.G. Sonone[4] and S.G. Bhave
[1,3,4]Agricultural Research Station, Shirgaon, Dist. Ratnagiri - 415 629 (MS)
[2,5]Department of Agricultural Botany, Collage of Agriculture, Dapoli-415 712.
* Email : **arsshirgaon@rediffmail.com**

(Received: 11 July 2017; Revised: 31 Oct 2017; Accepted: 21 Dec 2017)

Abstract
Twenty F_1s were developed by utilizing nine diverse parents 4 lines and 5 testers in Line x Testers mating design During *Kharif* 2015. The estimates of mean sum of squares due to male, female, male vs female, hybrids and parents vs hybrids showed significant variation. Large numbers of heterotic crosses were observed in most of the characters. The maximum positive standard heterosis for dry pod yield plant^{-1} (g) over best check TKG-Bold was observed in RHRG 6083 x TAG 24 (63.31%) followed by RHRG 6083 x JL 777(54.14%) and RHRG 1225 x TAG 24 (42.07%) and significant heterosis for other yield contributing traits *viz*., number of primary branches plant^{-1}, number of pods plant^{-1}, number of kernels pod^{-1}, dry haulm yield plant^{-1}, 100 kernel weight and shelling percentage. The maximum negative standard heterosis for days to maturity over best check TKG-Bold was observed in TG 37A x ICG 2630 (-18.61%) followed by RHRG 1225 x TAG 24 (-12.50) and TG 37A x JL 777(-11.67). The combinations *viz*., RHRG 6083 x TAG 24, RHRG 6083 x JL 777 and RHRG 1225 x TAG 24 could be utilize for selection of desirable segregants in further segregating generations.

Key words
Groundnut, heterosis, hybrids, line × tester analysis.

Introduction

The cultivated groundnut (*Arachis hypogaea* L.; Family Leguminosae), native to Brazil in South America is one of the most important oilseeds and food crop of the world. It is cultivated in more than 100 countries on 26.54 m hectare area with an annual production of 43.91 m tonnes and productivity of 1655 kg/ha (FAOSTAT, 2015). In India, groundnut is grown on 4.77 m hectare area with the production of 7.40 m tonnes (FAOSTAT, 2015). The productivity of groundnut in India is low (1552 kg/ha) compared to Israel (7389 kg/ha), USA (4397 kg/ha), China (3492 kg/ha) and Argentina (2848 kg/ha) (FAOSTAT, 2015). Groundnut kernels are regarded as healthy foods as their nutrient profile is balanced (Arya *et al*., 2016). The kernels contain 48-50% oil, 10-20% carbohydrates, and 25-28% easily digestible protein, and provides 564 kcal of energy for every 100 g of kernels (Arya *et al*., 2016)

Most of the groundnut breeding programmes aimed at improving productivity have been directed towards hybridization followed by selection in segregating generation. Since groundnut is a predominately self pollinated crop and commercial product of F1 seed is not currently feasible, it was felt that heterosis in groundnut is unstable. However, the magnitude of heterosis provide the basis of genetic diversity and a guide for choice of desirable parents for developing superior F1 hybrids to exploit hybrid vigour and are building gene pool to be employed in breeding programme. Heterosis in F1 generation expressed in terms of superiority over the better / mid-parent/standard parent is of direct relevance not only for developing hybrids in cross-pollinated crops, but also in self pollinated crops because heterotic crosses help the breeder to select appropriate crosses which would lead to desirable transgressive segregants in advanced generations (Arunachalam *et al*., 1984). Stokes and Hull (1930) first observed the manifestation of heterosis for different traits in groundnut. Since then, several investigators reported heterosis for yield and its components in groundnut (Deshmukh *et al*., 1985 and Dwivedi *et al*., 1994). According to the available evidence, heterosis in groundnut is related to the parental genetic diversity. Promising F1s with desirable traits may be advanced further to obtained transgressive segregants. Therefore with present study, the magnitude of heterosis for pod yield and other physiology traits were studied in 20 crosses of groundnut.

Materials and Methods

The experimental material for the present study comprised nine genotype *viz.*, 4 lines (RHRG 6083, TG 37A, Konkan Gaurav & RHRG 1225) and 5 testers (RTNG 29, KDG 209, TAG 24,ICG 2630 and JL 777). The crossing programme was under taken during December 2014 to April 2015 and evaluation of F_{1s} along with parents and two standard checks was done during August 2015 to

Electronic Journal of Plant Breeding, 8(4): 1140-1147 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00166.1

November 2015 at the Experimental Farm of Agricultural Research Station, Shirgaon (Ratnagiri). The experiment was laid out in completely randomized block design with 3 replications. The experiment was sown with three rows of three meter length. The row to row spacing was 30 cm and 10 cm between plant to plant. The recommended fertilizer at the rate of 25 kg N and 50 kg P_2O_5 along with 5 tonns of FYM per hectare were applied at the time of sowing. All other recommended practices and plant protection measures were adopted to raise healthy crop. The observations were recorded on five randomly selected competitive plants in parents and F_1s. Heterosis over better parent (BP) as per Fonseca and Patterson (1968) was calculated, while standard heterosis (SH) using two varieties TKG-Bold and Konkan Gaurav as standard check was calculated as per Meredith and Bridge (1972).

Result and discussion

The estimates of mean sum of squares (Table 1) due to male, female, male vs female, hybrids and parents vs hybrid showed significant variation for most of the characters studied indicating the presence of significant variation among the genotypes as well as crosses studied. The significant variations were showed by the characters *viz*., plant height (cm), number of pods plant^{-1}, dry pod yield plant^{-1} (except female),dry haulm weight plant^{-1}, hundred kernel weights (g), shelling percentage % (except Males vs Female), sound mature kernel (%), oil content (%) and protein content % (except Parents vs Hybrids). For the traits days to fifty per cent flowering source of variation due to male vs female and parents vs hybrid were significant. Considerable genetic variation for various traits including pod yield have been reported by many workers (Golakia *al.* 2005; Khote *et al.* 2009).

In present investigation, heterosis was recorded over better parent, and two standard checks TKG Bold and Konkan Gaurav (SC-I and SC-II). The range of standard heterosis and number of hybrids showing desirable significant heterosis over better parents and standard checks are presented in Table 2. The important three best promising cross combinations, their heterobeltiosis and standard heterosis for various traits are presented in Table 3. Positive heterosis was considered as desirable for the yield contributing characters while negative heterosis is considered as desirable for the characters days to 50 per cent flowering, plant height and days to maturity. The significant negative heterosis for days to 50% flowering was observed in 1 and 19 hybrids over better parent and TKG Bold respectively. The cross RHRG 6083 X RTNG 29 recorded maximum negative heterosis over standard check-I (TKG Bold,-15.66) and standard check-II (Konkan Gaurav, -4.11). The standard heterosis ranged from -15.66 to 12.06. Earliness is desirable character helps to develop early varieties. The early flowering in hybrids has also been reported by Khote *et al.*, 2009. Large numbers of heterosis crosses were observed in most of the characters.

The extent of standard heterosis for plant height ranged from -36.00 to 50.47 % over check. The cross Konkan Gaurav X ICG 2630 recorded maximum negative heterosis over better parent (-28.09%), TKG Bold (-36.00%) and Konkan Gaurav (-12.99%). Dwarf and semi-spreading plant structure is desirable to develop high yielding varieties suitable for heavy rainfall zones. The significant negative heterosis for plant height was observed in 4, 19 and 2 hybrids over BP, SH-I and SH-II respectively. These finding are in conformity with Vyas *et al.* 2001. Among the hybrids under investigation the significant positive heterosis was observed for number of primary branches plant^{-1} in 6, 3, 10 hybrids over BP, SH-I and SH-II. Among these hybrids, RHRG 6083 X JL 777 (15.38%), Konkan Gaurav X TAG 24 (10.10%) and TG 37A X JL 777 (7.29%) were found to be heterobeltiosis for this trait. Significant heterosis for number of primary branches per plant over better parent has been reported by Yadav *et al.* 2006. Number of pods plant^{-1} is one of the most important yield components. Thus, the hybrids with positive heterosis are desirable for higher yields. Total 18, 20 and 15 hybrids showed positive and significant heterosis for number of pods plant^{-1} over better parent, TKG Bold and Konkan Gaurav respectively. Heterosis for number of pods plant^{-1} contributing increased yield is also reported by Sharma and Gupta 2010. The significant positive heterosis was observed for number of kernels pod^{-1} in 10, 4 and 7 hybrids over BP, SH-I and SH-II respectively. The maximum positive standard heterosis for number of kernels pod^{-1} recorded by the cross RHRG 6083 X RTNG 29 over TKG Bold and Konkan Gaurav were 1.69% and 2.56% respectively. The maximum positive standard heterosis for dry pod yield plant^{-1} over check TKG Bold was observed in RHRG 6083 X TAG 24 (63.31%) followed by RHRG 6083 X JL 777 (54.14%) and RHRG 1225 X TAG 24 (42.07%). The range of standard heterosis was 6.47 to 89.54 over check TKG Bold. Estimates of standard heterosis for pod yield plant^{-1} were highly significant and positive in all hybrids over BP, SH-I and SH-II. The cross RHRG 6083 X TAG 24 recorded highest standard heterosis for dry haulm yield plant^{-1} (g) of 40.47% over TKG Bold and 53.00% over Konkan Gaurav. Standard heterosis varied from -4.39 to 72.37% over check. The significant positive heterosis was observed for dry haulm yield plant^{-1} (g) in 19, 13 and 20 hybrids over BP, SH-I and SH-II. High heterosis for pod yield and its contributing traits has been reported by Jivani *et al.* 2008; Sharma and Gupta 2010.

Electronic Journal of Plant Breeding, 8(4): 1140-1147 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00166.1

The range of standard heterosis for 100 kernel weight was -27.72 to 25.24% over check. The maximum positive standard heterosis for 100 kernel weight (g) was recorded by the RHRG 6083 X KDG 209 over Konkan Gaurav was 14.65%. The significant positive heterosis for 100 kernel weight was observed in 10, 0 and 6 hybrids over better parent, TKG Bold and Konkan Gaurav respectively. The maximum positive standard heterosis was recorded for shelling percentages by the RHRG 1225 X ICG 26 over TKG Bold and Konkan Gaurav were 9.84 and 6.84% respectively. Estimate of standard heterosis for shelling percent were significant and positive in 3, 12 and 4 hybrids over BP, SH-I and SH-II. These results are comparable with the work done by Gor *et al.* (2012) and John *et al.* (2014).

The extent of standard heterosis for sound mature kernel (%) ranged from -8.23 to 11.03% over check. The cross TG 37A X TAG 24 recorded maximum positive heterosis over better parent (9.87%), TKG Bold (4.49%) and Konkan Gaurav (0.16%). The significant negative heterosis for days to maturity was observed in 3, 10 and 6 hybrids over better parent TKG Bold and Konkan Gaurav respectively. The cross TG 37A X ICG 2630 recorded maximum negative heterosis over TKG Bold (-18.61%) and Konkan Gaurav (-16.05%). The standard heterosis over the check ranged from -23.06 to 10.97%. The early maturity in hybrids was also been reported by John *et al.* (2014), Arunachalam *et al.* (1984), Jayalakshmi *et al.* (2000). Thirteen crosses showed significant positive heterosis for oil content over TKG Bold with the range of -13.32 to 20.03%. The maximum positive standard heterosis for oil content was recorded by RHRG 6083 X ICG 2630 (13.84%) followed by RHRG 1225 X TAG 24 (10.26%) over check TKG Bold. The cross Konkan Gaurav X TAG 24 exhibited maximum standard heterosis for protein content (%) over TKG Bold (18.66%) and Konkan Gaurav (11.70%). The significant positive heterosis was observed for protein content in 9 hybrids over TKG Bold.

Improvement in a complex attribute like pod yield may be convenient if breeding programme will be made through attributing agro economical characters. The utility of hybrid breeding approach lies in the identification of most heterotic and useful cross combinations. Three hybrids were identified which were found superior than their respective better parents as well as standard checks in respect of dry pod weight plant^{-1}. The best three hybrids on the basis of heterosis over high yielding standard checks TKG Bold and Konkan Gaurav were, RHRG 6083 x TAG 24 (SC-I = 63.31%, SC-II = 82.94%), RHRG 6083 x RTNG 29 (SC-I = 57.41%, SC-II = 76.33%), and RHRG 6083 x JL 777 (SC-I = 54.14%, SC-II = 72.66%). The comparison of three crosses with high heterobeltiosis for pod yield with other yield attributing traits (Table 4) revealed that manifestation of heterosis for pod yield by RHRG 6083 X TAG 24, also showed heterotic effect for days to 50% flowering, plant height, number of pod plant^{-1}, number of kernels plant^{-1}, dry haulm yield plant^{-1} and shelling percentage. Similarly, heterosis for pod yield by RHRG 6083 X RTNG 29, also showed heterotic effect for number of primary branches plant^{-1}, number of pods plant^{-1}, number of kernels pod^{-1} and dry haulm yield plant^{-1}. Also heterosis for pod yield by RHRG1225 X TAG 24 showed desirable heterotic effect for plant height, number of primary branches plant^{-1}, number of pods plant^{-1} and dry haulm yield plant^{-1}. Such varying heterotic effect exhibited by different character were reported by Gor *et al.* (2012), Boraih *et al.* (2012), Wyne *et al.* (1970), John *et al.* (2014), Azad *et al.* (2014), Arunachalam *et al.* (1984), Jayalakshmi *et al.* (2000).

The findings revealed that both additive and non-additive gene effects are main genetic components which controls pod yield and its contributing characters. The efforts can be made to develop multiple crosses among desirable F1s, following some sort of inter mating, which will considerably increase the frequency of potential and desirable transgressive segregants in the segregating generations. These segregating generations are to be subjected to intensive objective oriented selection for crop improvement.

References

Arya, S.S., Salve, A.R. and Chauhan, S. 2016. Peanuts as functional food: a review. *J. Food Sci. Technol*., 53: 31–41.

Arunachalam,V., Bandyopadhyay, A., Nigam, S.N. and Gibbons, R.W. 1984. Heterosis in relation to genetic divergence and specific combining ability in groundnut (*Arachis hypogaea* L.). *Euphytica*., **33**(1): 33-39.

Azad, A.K. Alam, S., Hamid, A., Rafii, Y. and Malek, M.A. 2014. Combining ability of pod yield and related traits of groundnut (*Arachis hypogaea* L.) under Salinity Stress. *The Scientific World Journal,* **7**(3): 1-7.

Deshmukh, S. K., Zade, V.R., Reddy, P.S., 1985. Heterobeltiosis in groundnut. *Indian J. Agric. Sci.* 85, 358-361.

Dwivedi, S. L., Nagabhushanam, G.V.S., Nigam, S.N., Raghunath, K., Jambhunathan, R., 1994. Germplasm enhancement for seed quality traits in groundnut. *Int.Arachis Newslett.* 14, 14-15.

FAOSTAT, 2015. Online Agriculture Statistics http/www.faostat.org.

Fonseca, S. and Patterson, F. 1968. Hybrid vigour in seven parent diallel crosses in common winter wheat (*Triticum aestivum* L.). *Crop Sci.,* **8**: 85-95.

Golakia, P.R., Makne, V.G. and Monpara, B.A. 2005. Heritable variation and association in Virginia runner and Spanish bunch group of groundnut (*Arachis hypogaea* L.). *National J. Pant Improv.*, **7:** 50-53.

Gor, H.K., Dhaduk, L.K. and Lata, R. 2012. Heterosis and inbreeding depression for pod yield and its components in groundnut (*Arachis hypogaea* L.). *Electronic Journal of Plant Breeding*, **3**(3): 868-874.

Jayalakshmi, V., Reddy, C.R. and Reddy, G.L.K. 2000. Heterosis in groundnut (*Arachis hypogaea* L.) *Legume Res.*, **23**(2): 155-158.

Jivani, L.L., Khanpara, M.D., Kachhadia, V.H. and Modhvadia, J.M. 2008. Heterosis and inbreeding depression for pod yield and its related traits in Spanish bunch groundnut (*Arachis hypogaea* L.). *Res. on Crops*, **9**: 670-674.

John, K. and Reddy, R.P. 2014. Combining ability and heterosis for yield and water use efficiency traits in groundnut. *Legume Research - An International Journal*, **373**: 235-244.

Khote, A.C., Patil, P.P., Patil, S.P. and Walke, B.K. 2009. Genetic variability studies in groundnut (*Arachis hypogaea* L.) *Intl. J. Plant Sci.*, **4**: 141-149.

Meredith, W.R. and Bridge, R.R. 1972. Heterosis and gene action in cotton (*Gossypium hirsutum)*. *Crop Sci.*, **12**: 304-310.

Sharma, L.K. and Gupta, S.C. 2010. Heterosis for pod yield and related attributes in groundnut (*Arachis hypogaea* L.). *Res. on Crops*, **11**: 465-470.

Vyas, V., Nagda, A.K. and Sharma, S.P. 2001. Heterosis for pod yield and its components in groundnut (*Arachis hypogaea* L.). *Crop Res.*, **22**: 267-270.

Yadav, K.N.S., Gowda, M.B., Savithramma, D.L. and Giris, G. 2006. Heterosis for yield and yield attributes in groundnut. *Crop Res.*, **32**: 86-89.

Table 1. General ANOVA in Line x Tester analysis for thirteen characters of Groundnut (*Arachis hypogaea* L.)

Source	DF	DFF	PH	NPB	NPPP	NKPP	DPW	DHW	HKW	SH	SMK	DM	OC	PC
Male	4	1.26	141.78**	1.37	16.77**	0.009	19.57**	11.74**	39.16**	7.06**	43.29**	185.76**	19.10**	4.82**
Female	3	1.63	20.32**	0.047	30.01**	0.001	0.825	3.74*	51.7**	27.19**	31.49**	418.08**	18.96**	6.07**
Male vs Female	1	5.20**	65.44**	0.025	51.70**	0.001	6.00**	18.15**	30.81**	0.15	23.09**	28.01**	96.08**	2.05**
Hybrids	19	1.67	79.27**	0.625	35.04**	0.007	29.32**	26.82**	46.41**	22.89**	18.96**	166.89**	25.67**	6.29
Parents vs hybrids	1	8.09**	610.82**	0.127	903.45**	0.1	1,244.17**	1,141.60**	684.14**	22.80**	166.30**	136.30**	296.7**	98.5**
Error	56	4.8	17.75	0.091	5.68	0.008	7.38	9.21	14.61	4.36	7.05	11.41	5.4	5.8

* Significant at 5 per cent, ** Significant at 1 per cent

DFF = Days to fifty per cent flowering, PH = Plant Height (cm), NPB= Number of Primary Branches^{-1}, NPPP = Number of pods plant^{-1}, NKPP = number of kernel pod^{-1}, DPW = Dry pod yield plant^{-1} (g), DHW = Dry haulm weight plant^{-1}, HKW = Hundred kernel weight, SH % = Shelling percentage, SMK= Sound mature kernel, DM= Days to maturity, OC = Oil content (%), PC = Protein content (%)

Table 2. Heterosis ranged for quantitative trait and number of hybrids exhibiting significant heterosis in Groundnut

SI. No.	Characters	Range (%)	SE±	No. of hybrids showed desirable significant heterosis over		
				BP	TKG-Bold (SH-I)	Konkan Gaurav (SH-II)
1	Days to 50 % flowering	-15.66 to12.06	1.49	1	19	0
2	Plant height (cm)	-36.00 to 50.47	2.81	4	19	2
3	No. of primary branches plant^{-1}	-32.17 to 25.65	0.20	6	3	10
4	No. of pods plant^{-1}	-6.48 to 90.39	1.63	18	20	15
5	No. of kernels pod^{-1}	-9.84 to 4.35	0.04	10	4	7

Electronic Journal of Plant Breeding, 8(4): 1140-1147 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00166.1

6	Dry pod yield plant^{-1} (g)	6.47 to 89.54	1.83	20	20	20
7	Dry haulm yield plant^{-1} (g)	-4.39 to 72.37	1.88	19	13	20
8	100 Kernel weight (g)	-27.72 to 25.24	2.53	10	0	6
9	Shelling (%)	-7.87 to 8.84	1.41	3	12	4
10	Sound mature kernel (%)	-8.23 to 11.03	1.80	5	**11**	**5**
11	Days to maturity	-23.06 to 10.97	2.24	**3**	10	6
12	Oil content (%)	-13.32 to 20.03	1.18	12	13	10
13	Protein content (%)	-7.41 to 27.15	1.43	15	9	4

BP-Better parent, SH- Standard heterosis

Electronic Journal of Plant Breeding, 8(4): 1140-1147 (Dec 2017)
ISSN 0975-928X
DOI: 10.5958/0975-928X.2017.00166.1

Table 3 Three best performing cross combination, their heterobeltiosis and standard heterosis for various traits

Characters	Best performing hybrids	Heterobeltiosis (%)	Standard Heterosis over checks	
			TKG-Bold (SH-I)	Konkan Gaurav (SH-II)
Days to 50 % flowering	RHRG 6083 X RTNG 29	-9.091**	-15.66**	-4.11
	RHRG 1225 X KDG 209	-4.000	-13.25**	-1.37
	RHRG 1225 X JL 777	-2.667	-12.05**	0.28
Plant height (cm)	K.GAURAV X ICG 2630	-28.090**	-36.00**	-12.99**
	TG 37 A X ICG 2630	-15.730**	-25.00**	1.96
	RHRG 1225 X ICG 2630	-11.985**	-21.67**	6.50
No. of primary branches plant^{-1}	RHRG 6083 X JL 777	15.38**	8.11**	21.21**
	K.GAURAV X TAG 24	10.10**	-1.80**	10.10**
	TG 37 A X JL 777	7.29**	-7.21**	4.04**
No. of pods plant^{-1}	RHRG 6083 X TAG 24	73.267**	79.49**	51.08**
	RHRG 6083 X JL 777	63.366**	69.23**	42.45**
	RHRG 1225 X TAG 24	51.406**	28.89**	8.49**
No. of kernels pod^{-1}	RHRG 6083 X RTNG 29	3.448**	1.69**	2.56**
	RHRG 6083 X ICG 2630	1.724**	-0.85**	0.03
	RHRG 6083 X JL 777	1.724**	-0.85**	0.09
Dry pod yield plant^{-1} (g)	RHRG 6083 X TAG 24	79.737**	63.31**	82.94**
	RHRG 6083 X JL 777	69.641**	54.14**	72.66**
	RHRG 1225 X TAG 24	55.625**	42.07**	59.14**
Dry haulm yield plant^{-1} (g)	RHRG 6083 X TAG 24	61.335**	40.47**	53.00**
	RHRG 6083 X RTNG 29	45.165**	35.35**	47.42**
	RHRG 1225 X TAG 24	40.493**	21.66**	32.51**
100 Kernel weight (g)	RHRG 6083 X KDG 209	21.755**	-8.28*	14.65**
	K.GAURAV X ICG 2630	17.847**	-5.72	17.85**
	K.GAURAV X RTNG 29	14.861**	-8.11*	14.86**
Shelling (%)	RHRG 1225 X ICG 2630	6.178**	9.84**	6.84**
	RHRG 1225X RTNG 29	4.839*	4.60*	1.74
	RHRG 6083 X TAG 24	4.254*	11.49**	8.45**

Cont….Cont….

Characters	Best performing hybrids	Heterobeltiosis (%)	Standard Heterosis over checks	
			TKG-Bold (SH-I)	Konkan Gaurav (SH-II)
Sound mature kernel (%)	TG 37 A X TAG 24	9.879**	4.49	0.66
	TG 37 A X KDG 209	7.886**	7.91**	3.95
	RHRG 1225 X KDG 209	6.270*	9.30**	5.29*
Days to maturity	TG 37 A X ICG 2630	-11.145**	-18.61**	-16.05**
	TG 37 A X JL 777	-7.558*	-11.67**	-8.88**
	RHRG 1225 X TAG 24	-7.080*	-12.50**	-9.74**
Oil content (%)	RHRG 6083 X ICG 2630	15.73**	13.84**	10.70**
	RHRG 1225 X TAG 24	13.45**	10.26**	7.22**
	RHRG 6083 X RTNG 29	11.75**	2.05	-0.77
Protein content (%)	K.GAURAV X TAG 24	24.91**	18.66**	11.70**

K.GAURAV X JL 777	18.39**	12.46**	5.87**
RHRG 6083 X TAG 24	10.72**	2.62	-3.39

* Significant at 5 per cent ** Significant at 1 per cent

Table 4. Promising hybrids for pod yield plant^{-1} with mid parent, heterobeltiosis and standard heterosis in groundnut

SI. No.	Hybrid	Pod yield plant^{-1}	Mid parent (%)	Heterobeltiosis (%)	Standard heterosis (%)		Useful and significant heterosis for component traits			
					SC-I	SC-II	MP	Heterobeltiosis	SC-I	SC-II
1	RHRG 6083 X TAG 24	33.23	89.54**	79.73**	63.31**	82.94**	DFF, PH, NPB, NPPP, NKPP, DPW, DHW, HKW, SH %,	DFF, PH, NPPP, NKPP, DPW, DHW, HKW, SH%,	DFF, PH, NPB, NPPP, NKPP, DPW, DHW, HKW, SH %, DM,	DFF, PH, NPB, NPPP, NKPP, DPW, DHW, SH %,
2	RHRG 6083 X RTNG29	32.03	61.41**	51.10**	57.41**	76.33**	DFF, PH, NPB, NPPP, NKPP, DPW, DHW, DM,	DFF, NPB, NPPP, NKPP, DPW, DHW,	DFF, PH NPB, NPPP, NKPP, DPW, DHW, HKW,	NPB, NPPP, NKPP, DPW, DHW,
3	RHRG 1225 X TAG 24	28.91	64.47**	55.62**	42.07**	59.14**	PH, NPB, NPPP, DPW, DHW, HKW, SMK,	PH, NPB, NPPP, NKPP, DPW, DHW, SMK, DM,	DFF, PH, NPB, NPPP, NKPP, DPW, DHW, HKW, SMK, DM,	PH, NPB, NPPP, NKPP, DPW, DHW, DM,

*, ** Significant at 5 and 1 per cent probability levels, respectively; SC-I - TKG - Bold; SC-II - Kokan Gaurav.

DFF = Days to fifty per cent flowering, PH = Plant Height (cm), NPB= Number of Primary Branches^{-1}, NPPP = Number of pods plant^{-1}, NKPP = number of kernel pod^{-1}, DPW = Dry pod yield plant^{-1} (g), DHW = Dry haulm weight plant^{-1}, HKW = Hundred kernel weight, SH % = Shelling percentage, SMK= Sound mature kernel, DM= Days to maturity