Legume Res., 30 (4) : 250 - 255, 2007

HETEROSIS FOR PHYSIOLOGICAL AND YIELD TRAITS IN GROUNDNUT *(ARACHIS HYPOGAEA* L.)

O. Venkateswarlu, K. Raja Reddy, P.V. Reddy, R.P. Vasanthi, K. Hari Prasada Reddy and N.P. Eswara Reddy

Regional Agricultural Research Station,
Tirupati - 517 502, India

ABSTRACT

A set of 28 crosses involving 8 parents was studied to get information on the extent of heterosis over better parent, mid parent and standard parent for physiological and yield attributes. The maximum better parent heterosis for pod yield per plant was observed to be 62.63% and that of standard parent and mid parent found to be 72.92% and 66.43% respectively. The crosses showing heterosis for pod yield per plant were not heterotic for all the characters.K-134 x JUG-43, K-134 x JL-24, JAL-6 x JL-24 and JUG-37 x JL-24 hybrids were identified as promising for many desirable traits and they may be useful in exploiting hybrid vigour in groundnut.

INTRODUCTION

The magnitude of heterosis provides a basis for genetic diversity and a guide to the choice of desirable parents for developing superior F_1 hybrids so as to exploit hybrid vigour and /or for building better gene pool to be employed in population improvement. Estimation of heterosis over better parent may be useful in identifying true heterotic crosses combinations but these crosses can be of immense practical value if they show superiority over the standard parent or the best variety of the area. In the recent past plant breeders have extensively explore and utilized heterosis in boosting up yields in a number of crops. Groundnut is a highly self-pollinated crop and the scope for exploitation of hybrid vigour will depend on the direction and magnitude of heterosis, biological and feasibility and nature of gene action. Study of heterosis will have a direct bearing on the breeding methodology to be employed for varietal improvement .The present investigation was therefore, planned to estimate the extent of heterosis over better parent, mid parent and standard parent in 28F_1s of groundnut for 13 characters.

MATERIAL AND METHODS

Twenty eight F_1s were obtained by crossing eight parents *viz.*, TIR-46, JUG-37, ICR-45, TIR-10, K-134, JAL-6, JUG-43 and JL-24 in diallel manner without reciprocals. The eight parents and their resultant twenty eight F_1s were raised in a randomized block design with three replications during 2002 at Regional Agricultural Research Station, Tirupati. In each replication each parent and F_1 was grown in a single row of 4m length spaced 30 cm apart with a plant to plant distance of 10cm. Recommended cultural practices were adopted to raise good crop. At 75 days after sowing 3 rd healthy leaf from the apex on the main stem of each of the parent and F_1s selected at random from each replication of 10 plants were used to record data on four characters *viz.*, SPAD chlorophyll meter reading, specific leaf nitrogen, specific leaf area and per cent reduction of Fv/Fm. Similarly at maturity data were recorded for nine characters *viz.*, root length, harvest index, shell thickness, oil per cent, shelling per cent, sound mature kernel per cent, number of well filled and mature pods per plant, kernel yield per plant and pod yield per plant. The mean value of 10 plants were utilized for estimation of heterosis over better parent , mid parent and standard parent (K-134) using standard procedures.

RESULTS AND DISCUSSIONS

The mean sum of squares due to genotypes were highly significant for all the

TABLE 1. Range of heterosis for 13 characters in groundnut

Character	Mid parent	Better parent	Standard parent
SPAD chlorophyll meter reading	-3.67 to 12.11	-06.40 to 20.77	-2.55 to 6.94
Specific leaf nitrogen	-49.04 to -1.58	-47.18 to 1.50	-44.05 to 9.97
Specific leaf area	2.50 to 94.98	-4.80 to 82.07	-0.39 to 103.44
Per cent reduction of Fv/Fm	-17.37 to 37.33	-24.95 to 27.73	-8.42 to 37.33
Root length	-43.47 to 42.55	-42.51 to 47.88	-41.70 to 46.44
Harvest index	-38.51 to 38.24	-35.29 to 51.00	-17.78 to 40.00
Shell thickness	-31.97 to 52.83	-35.82 to 44.74	-26.09 to 53.91
Oil per cent	-13.81 to 10.25	-11.71 to 14.51	10.69 to 10.88
Shelling per cent	-27.18 to 14.80	-27.10 to 16.28	-21.47 to 17.79
Sound mature kernel per cent	-20.70 to0 7.96	-22.41 to 14.55	-23.36 to 8.61
Number of well filled and mature pods/plant	-38.82 to 54.07	-28.88 to 68.64	-23.97 to 48.35
Kernel yield/ plant	-44.56 to 73.10	-28.29 to 59.44	-13.07 to 73.06
Pod yield/ plant	-45.43 to 62.63	-29.83 to 66.43	-9.12 to 72.92

characters indicating the diversity of parents. The range of heterosis over the mid parent, better parent and standard check for 13 characters have been presented in Table 1.The range of heterosis exhibited by hybrids over the respective mid parent, better parent and standard parent for pod yield per plant was –28.83 to 66.43%, -45.43 % to 62.63 % and – 9.12 % to 72.92% respectively (Table 1) and seven and six hybrids showed significant positive heterosis over mid parent and better parent respectively for pod yield per plant . For pod yield per plant maximum better parent heterosis was recorded in the cross K-134 x JUG-43 (62.63%) closely followed by ICR-45 x JUG-43 (41.30%) and K-134 x JL-24 (32.57%). Similarly, crosses that recorded maximum mid parent heterosis were K-134 x JUG-43 (66.43%) closely followed by ICR-45 x JUG-43 (41.40%) and K-134 x JL-24 (40.37%) (Table 2-4). These hybrids were also superior on *per se* performance. Heterosis for pod yield in groundnut was also reported by several workers in the past (Rudraswamy *et al.*, 1999 and Parmar *et al.*, 2004) is in accordance with the present findings. Medium x low, medium x high, medium x medium and low x low crosses showed significant positive high heterosis over mid parent, better parent and standard parents, indicating the presence of non-additive gene action (dominance and epistatis). The results are in close agreement with the findings of Paramar *et al.*, (2004) and Mothilal *et al.*, (2004).

For the improvement of drought and heat tolerant characters viz., specific leaf area and percent reduction of Fv/Fm and shell thickness, negative heterosis will be desirable. For the characters, per cent reduction of Fv/Fm, highest heterosis was recorded by ICR-45 x JL-24 over mid parent (-24.95%) and better parent (-31.97%). For shell thickness, TIR-46 x K-134 (-35.82%) and TIR-46 x JUG-37 (-31.97%) hybrids showed desired significant heterosis over mid parent and better parent respectively. The negative heterosis observed in some of the crosses may be attributed to non–allelic interaction which can either increase or decrease the expression of heterosis. Theses results are akin to Vasanthi and Raja Reddy (2002.).Pallas (1982) also reported heterosis for specific leaf area in groundnut. The highest heterosis recorded for SPAD chlorophyll meter reading (JUG–37 x JL-24) 12.11%, 20.71% and 6.73% and for root length (JUG–37 x JL-24) 47.88%, 42.55% and 46.44% over mid parent, better parent and standard parent respectively (Table 2-4). Therefore, the best hybrid for SPAD chlorophyll meter reading was JUG–37 x JL-24 and for root length JUG–37 x JL-24.

TABLE 2. Better parent heterosis for 13 characters

Crosses	SPAD chlorophyll meter reading	Specific leaf nitrogen	Specific leaf area	Per cent reduction of Fv/Fm	Root length	Harvest index	Shell thickness	Oil per cent	Shelling per cent	Sound Mature Kernel per cent	No. of well filled pods per plant	Kernel yield per plant	Pod yield per plant
TIR-46xJUG-37	-3.48	-49.04	52.63**	-12.50**	-20.67**	-7.79	-31.97**	-0.14	0.93	-7.25*	7.12	-21.20*	-22.12*
TIR-46xICR-45	-1.85	-29.67	39.23**	-2.84	-23.56**	12.99*	-18.69**	5.69	1.39	-10.15**	37.53	48.99*	30.97**
TIR-46xTIR-10	-2.33	-30.02	64.06**	-12.84**	-12.98*	1.95	-8.08**	1.33	0.00	-2.67	-8.72	-12.23	-3.31
TIR-46xK-134	1.06	-33.13	63.43**	37.33**	-43.47**	1.95	-25.60**	7.02*	-0.46	-19.85**	5.41	-2.96	9.04
TIR-46xJAL-6	1.52	-16.60	36.97**	4.34	7.91	-18.18**	21.09**	-8.68*	-4.17	-6.87*	-8.52	-1.48	16.67
TIR-46 JUG-43	-3.34	-28.42	79.18**	24.18*	-25.22**	-5.84	1.82	-4.97	0.00	1.15	16.14	1.30	1.77
TIR-46xJL-24	1.09	-20.80	35.34**	2.01	42.55**	-7.14	15.41**	-6.33	-7.41	-11.83**	-9.50	-28.40	0.75
JUG-37xICR-45	2.64	-33.68	30.97**	-9.04**	22.39**	2.70	52.83**	-7.68*	-3.94	-6.77*	8.44	-28.07**	-34.46**
JUG-37xIR-10	4.11*	-23.43	45.73**	-14.06**	17.00*	-12.16**	50.12**	4.03	-4.30	-1.67	-18.54	-41.45**	-29.16**
JUG-37xK-134	1.11	-33.40	65.41**	21.36**	-17.04*	2.70	24.70**	-2.95	3.66	4.51	-2.15	-40.0**	-45.43**
JUG-37xJAL-6	4.04*	-28.36	30.86**	1.21	-4.88	-38.51**	31.10**	-3.75	11.22*	-0.42	-33.49**	-35.06**	-32.55**
JUG-37xJUG-43	-4.66	-20.39	54.94**	27.13**	7.17	-7.43	41.34**	-0.45	1.46	6.28	23.36	-37.11**	-34.03**
JUG-37xJL-24	20.71*	-23.69	39.82**	1.31	-2.99	0.00	48.21**	1.68	-16.99**	0.39	28.64	-44.56**	-30.29**
ICR-45xTIR-10	5.66**	-43.07	73.12**	-12.81**	15.76*	21.74**	34.37**	0.05	-7.39	-10.15**	52.91**	26.25	23.46
ICR-45xK-134	4.74**	-40.34	69.14**	26.44**	20.00**	13.77*	-10.99**	3.71	3.45	-12.41**	4.90	24.79	23.16
ICR-45xJAL-6	13.26**	-41.37	79.62**	8.55	-11.40	-5.80	45.77**	4.53	-9.86	-9.02*	-12.43	-5.77	-1.90
ICR-45xJUG-43	-0.40	-42.45	93.62**	19.18**	0.6	-2.17	1.17	3.36	-13.17**	-8.27*	12.60	-22.04	41.30**
ICR-45xJL-24	0.92	-43.65	47.75**	-17.37**	3.86	23.91**	27.85**	-13.81	-7.77	-18.05**	54.07**	5.83	21.09**
TIR-10xK-134	1.98	-37.43	71.58**	13.59**	3.94	-8.09	7.58*	1.76	10.47*	-7.79*	-18.75	19.37	-9.09
TIR-10xJAL-6	1.62	-44.79	89.73**	4.78	-0.23	-13.24**	13.27**	9.38**	-15.31**	-11.56**	-38.82**	-1.08	-19.88
TIR-10xJUG-43	-2.27	-44.32	81.91**	7.36	-4.78	25.89**	28.7**	-1.93	-6.34	-3.56	27.76	-33.94	4.87
TIR-10xJL-24	2.54	-43.90	94.98**	15.93**	13.30*	23.89**	35.19**	10.25**	-4.85	-17.58**	33.72	3.89	23.88*
K-134xJAL-6	2.62	-40.46	63.55**	-0.57	-4.19	2.21	-5.92	0.66	14.80**	-10.25**	-6.86*	4.86	-12.02
K-134xJUG-43	-6.40**	-44.90	75.09**	-3.37*	-15.00*	25.00**	-9.10**	0.59	-11.71*	-9.43*	48.31**	47.64**	62.63**
K-134xJL-24	-2.55	-44.25	82.05**	-0.21	4.69	38.24**	31.39**	9.13*	-19.42**	-20.70**	43.24**	73.10**	32.57**
JAL-6xJUG-43	-2.60	-32.67	50.42**	20.22**	15.65*	-2.94	12.74**	-7.37*	4.39	7.96*	5.31	-22.73	-28.9**
JAL-6xJL-24	5.69**	-1.58	2.50**	-15.94**	2.79	-2.94	37.02**	9.53**	-11.17*	-11.33**	0.39	5.27	0.71
JUG-43xJL-24	-3.14	-16.60	9.95**	35.28**	-9.57	-2.65	-0.77	-2.41	-27.18**	-17.26**	30.23	-16.11	1.03
SE	0.89	0.10	4.75	2.94	0.89	0.03	0.03	1.66	3.47	2.83	3.35	2.94	3.55

*, ** Significant at 5% and 1% level of probability respectively.

TABLE 3. Mid parent heterosis for 13 characters

Crosses	SPAD chlorophyll meter reading	Specific leaf nitrogen	Specific leaf area	Per cent reduction of Fv/Fm	Root length	Harvest index	Shell thickness	Oil per cent	Shelling per cent	Sound Mature Kernel per cent	No. of well filled pods per plant	Kernel yield per plant	Pod yield per plant
TIR-46xJUG-37	-1.53	-47.18	-47.18	-14.99**	-19.32**	-5.96	-34.98**	0.52	8.46*	-2.99	17.95	-2.17	-2.0
TIR-46xICR-45	-0.82	-25.84	-25.84	-7.13*	-20.99**	19.18**	-29.45**	10.40**	4.53	-9.47**	47.07**	44.68**	32.34*
TIR-46xTIR-10	-1.04	-29.01	-29.01	-11.99**	-11.92*	18.05**	-23.52**	7.68*	9.09*	4.72	6.89*	0.11	8.81
TIR-46xK-134	2.29	-32.09	-32.09	20.73**	-42.51**	8.28	-35.82**	8.92**	5.65	-17.00**	15.02	1.65	11.21
TIR-46xJAL-6	3.20	-7.50	-7.50	-3.84	9.69	-13.10**	4.23	-4.59	0.49	5.63	15.55	7.36	30.32*
TIR-46 JUG-43	0.66	-26.94	-26.94	4.57	-21.46**	19.34**	-17.70**	-2.12	2.61	8.61**	17.88	4.49	2.76
TIR-46xJL-24	6.25**	-14.61	-14.61	-2.87	47.88**	7.12	-6.15	-4.44	-5.21	-10.81**	-7.43	-24.38	5.60
JUG-37xICR-45	3.65*	-32.49	-32.49	-10.47**	24.40**	6.29	25.94**	-2.98	0.26	-1.78	26.82	-8.85	-17.67
JUG-37xIR-10	4.84**	-21.74	-21.74	-15.66**	17.57**	0.00	18.43**	11.22**	-2.73	1.29	3.25	-19.80	-2.22
JUG-37xK-134	1.93	-29.94	-29.94	3.30	-16.73**	7.04	2.13	-0.61	5.04	5.59*	-1.17	-22.85**	-29.83**
JUG-37xJAL-6	7.86**	-17.97	-17.97	8.39*	-1.68	-35.29**	7.13*	1.18	14.14**	8.43*	-22.43	-24.98**	-22.07**
JUG-37xJUG-43	0.54	-19.13	-19.13	3.55	14.39**	15.61*	8.20**	3.17	6.39	9.25**	30.76*	-23.80**	-16.98
JUG-37xJL-24	12.11**	-14.96	-14.96	-6.40*	-1.02	13.41*	14.90**	4.39	-12.76**	3.84	38.75*	-28.29**	-8.57
ICR-45xTIR-10	5.94**	-40.79	-40.79	-15.80**	18.24**	34.40**	29.47**	1.87	-1.83	-2.65	68.64**	40.60**	40.20**
ICR-45xK-134	4.92**	-36.17	-36.17	5.68	22.42**	14.60*	-11.45**	6.50*	6.60	-8.63**	21.65	27.31**	26.90
ICR-45xJAL-6	10.20**	-31.84	-31.84	-4.71	-6.96	-5.11	44.74**	14.51**	-8.27	3.86	16.17	5.24*	8.56
ICR-45xJUG-43	2.68	-40.51	-40.51	-4.74	9.07	18.94**	-5.00	4.87	-12.75**	-0.81	22.09	-17.45**	41.4**
ICR-45xJL-24	7.12**	-36.21	-36.21	-24.95**	4.26	36.25**	20.71**	-11.71**	-7.09	-16.48**	68.05**	8.90**	28.18*
TIR-10xK-134	2.08	-35.56	-35.56	-1.24	4.07	0.81	4.21	6.35	13.75**	-4.05	2.23	8.19**	0.52
TIR-10xJAL-6	4.65**	-37.98	-37.98	-4.46	2.63	-4.84	9.94**	11.34**	-11.70*	-6.35	-13.40	-18.91**	-0.74
TIR-10xJUG-43	0.48	-43.96	-43.96	-10.62**	1.15	40.30**	25.53**	1.29	-0.26	-3.77	51.45**	21.69**	19.03
TIR-10xJL-24	9.13**	-38.72	-38.72	9.25**	16.16*	24.44**	32.57**	-6.43	1.55	-12.27**	59.44**	13.77**	35.31
K-134xJAL-6	5.57**	-34.80	-34.80	-4.83	-1.32	2.21	-6.10	3.39	16.28**	-1.35	9.53	16.67**	0.0
K-134xJUG-43	-3.67**	-42.90	-42.90	-7.02	-9.60	51.00**	-14.18**	2.13	-8.59**	-5.96	59.64**	59.44**	66.45**
K-134xJL-24	3.6*	-40.75	-40.75	-7.55*	7.21	51.00**	24.73**	9.40*	-16.37**	-18.8**	53.07**	52.08**	40.37**
JAL-6xJUG-43	3.03	-23.94	-23.94	10.55**	19.55**	17.33**	6.66*	-6.00	6.72	14.55**	-20.92	-18.22**	-20.5
JAL-6xJL-24	9.34**	1.50	1.50	-18.53**	8.33	6.02	30.34**	12.22**	-8.96*	-0.44	-23.88	20.57**	17.26
JUG-43xJL-24	5.79**	-8.25	-8.25	20.27**	-1.65*	8.91	-1.26	-1.46	-27.01**	-22.41**	31.25	2.11	6.87
SE	0.77	0.09	0.09	2.55	0.76	0.03	0.03	1.45	3.00	2.45	2.90	2.55	3.08

*, ** Significant at 5% and 1% level of probability respectively.

TABLE 4. Standard parent heterosis for 13 characters

Crosses	SPAD chlorophyll meter reading	Specific leaf nitrogen	Specific leaf area	Per cent reduction of Fv/Fm	Root length	Harvest index	Shell thickness	Oil per cent	Shelling per cent	Sound Mature Kernel per cent	No. of well filled pods per plant	Kernel yield per plant	Pod yield per plant
TIR-46xJUG-37	-1.90	-43.41	73.60**	11.56	-18.52	4.44**	10.43	4.81	14.13	-0.41	9.33	41.83	39.16
TIR-46xICR-45	-2.18	-18.97	58.29*	23.88	-21.48	28.89**	-18.26	9.49	14.65	-2.04	14.55	54.85	39.16
TIR-46xTIR-10	-2..18	-25.72	65.96*	13.32	-10.59	15.55**	-13.91	4.99	13.08	4.51	-23.97	-3.51	0.61
TIR-46xK-134	1.06	-30.87	63.43*	37.33*	-41.70	15.55**	-26.09	10.88	12.56	-13.93	5.42	6.70	14.25
TIR-46xJAL-6	-0.91	-13.83	60.82*	13.67	-14.59*	-6.67	20.00**	-5.61	8.37	0	30.61	29.67	53.59
TIR-46 JUG-43	2.48	-22.83	62.33*	15.15	-15.04	6.67**	10.46	-1.53	13.08	8.61	-0.30	18.60	7.95
TIR-46xJL-24	-1.34	-18.33	56.47*	18.19	46.44**	6.67**	4.35**	-2.95	4.71	-5.32	-21.08	-21.27	4.85
JUG-37xICR-45	4.33**	-23.47	48.83*	22.77	21.48**	13.33**	53.91**	-3.12	2.09	1.65	10.64	29.47	18.00
JUG-37xIR-10	5.81**	-14.79	47.87	11.75	13.92**	-4.44	40.87**	9.17	-6.81	-3.69	-16.88	5.40	27.55
JUG-37xK-134	2.76	-26.05	65.40*	31.49	-17.03	13.33**	28.69**	1.85	3.65	4.51	-0.15	8.00	1.74
JUG-37xJAL-6	5.73**	-20.26	49.34*	32.18*	-1.38	-33.33	30.43**	1.01	14.13	-2.05	-6.89	16.92	19.32
JUG-37xJUG-43	4.39**	-11.58	40.37	17.88	21.70**	2.22**	26.09**	4.45	8.39	4.12	22.81	13.20	18.81
JUG-37xJL-24	6.73**	-15.11	59.03*	17.38	-3.70	8.89**	33.91**	6.72	-10.47	5.34	31.27	-0.26	25.52
ICR-45xTIR-10	5.88**	-34.41	75.29**	13.32	16.07*	26.67**	26.09**	-5.18	-1.57	-2.04	10.85	31.42	31.17
ICR-45xK-134	4.75**	-31.19	69.13	26.44	20.00**	15.55**	-11.31	3.71	9.94	-4.50	4.92	29.93	30.84
ICR-45xJAL-6	6.94**	-32.48	103.44**	18.26	-5.93	-4.44	45.21**	8.49	-4.19	-0.81	25.04	24.07	29.14
ICR-45xJUG-43	5.60**	-33.76	75.41**	10.51	14.29*	0	-9.57	0.85	-6.81	0	-3.35	-8.72	50.11
ICR-45xJL-24	0.57	-35.05	68.90*	-4.26	-0.22	26.67**	14.78**	-0.14	-0.53	-10.65	32.03	10.15	17.07
TIR-10xK-134	2.20	-12.22	71.57	13.58	4.22	-6.67	0.86**	-0.41	10.46	-7.78	-17.38	5.40	-9.12
TIR-10xJAL-6	1.85	-41.15	92.11**	14.15	5.93	-13.33	6.09**	3.59	-13.09	-18.44	-12.67	-13.07	5.45
TIR-10xJUG-43	3.60*	-40.19	84.18**	-0.46	8.15	4.44**	14.78**	-4.32	0.51	-11.07	9.63	21.66	11.28
TIR-10xJL-24	2.76	-40.51	97.42**	34.29*	13.56*	4.44**	21.73**	-10.69	2.60	-13.53	16.57	2.99	17.07
K-134xJAL-6	2.63	-40.51	63.16*	-0.57	-0.96	2.22*	-6.98	0.67	17.79	-10.24	33.45	35.13	15.79
K-134xJUG-43	-0.76	-40.32	58.63*	-0.10	-3.48	26.67**	20.86**	0.95	-5.24	-10.48	48.35	73.06	72.92
K-134xJL-24	-2.55	-44.05	82.04**	-0.22	4.67	40.00**	18.26**	9.12	-13.09	-16.79	43.28	50.74	36.48
JAL-6xJUG-43	3.26	-27.65	36.28	11.47	31.33**	-2.22	0.86**	-9.62	12.03	-0.51	-12.42	1.69	-5.50
JAL-6xJL-24	0.21	-13.18	18.50	-8.42	9.11	-2.22	23.48**	8.97	-4.19	-6.96	-12.47	38.59	32.58
JUG-43xJL-24	0.69	-9.97	-0.39	25.44	2.74	-17.78	-11.30	-2.90	-21.47	-23.36	13.53	9.95	7.19
SE	0.89	0.10	4.75	2.94	0.89	0.03	0.03	1.66	3.47	2.83	3.35	2.94	3.55

*, ** Significant at 5% and 1% level of probability respectively.

For number of mature pods which are main components of yield, four and ten hybrids manifested significant positive heterosis over mid parent and better parent respectively. The hybrid, ICR-45 x JL-24 showed highest heterosis over mid parent (68.05%) and better parent (52.91%) respectively for number of well filled and mature pods per plant. Similar results have been reported by Mothilal *et al.,l (*2004) in groundnut. Similarly Manivel *et al*.,(2003) also reported significant heterosis for number of mature pods/ plant(93.65%)and pod yield /plant(45.3%) in groundnut.

For harvest index 15, 8 and 18 crosses exhibited significant positive heterosis over mid parent, better parent and standard parent, respectively. For oil percent 8 and 5 crosses, for shelling percent 5 and 3 crosses exhibited significant positive heterosis over mid parent and better parent respectively, whereas, for sound mature kernel per cent 5 crosses exhibited significant positive heterosis over better parent . Varman and Raveendran (1994) observed significant positive heterosis for sound mature kernel per cent in groundnut.. The crosses viz., K-134 x JL24, and K-134 x JAL-6 showed highest heterosis over mid parent, better parent and standard parent for harvest index and sound mature kernel per cent respectively. These results are in close agreement with the findings of Varman (2000) and Dwivedi *et al.,* (1998).

For the complex characters like, kernel yield per plant the range of heterosis observed was –28.29% to 59.44% (K-134 x JUG-43), –44.52 % to 73.10% (K-134 x Jl-24) and –13.07% to 73.06% (K-134 x JUG-43) over mid parent, better parent and standard parent respectively. Twelve and three hybrids also registered high significant positive heterosis over mid parent and better parent respectively for kernel yield per plant. The highest heterosis recorded among 28 crosses for 13 characters is in K-134 x JUG-43 for kernel yield per plant . Jayalakshmi *et al.,* (2000) reported higher heterosis over mid parent for kernel yield / plant(25.52%)followed by number of mature pods/plant and root dry mass in groundnut.

The data revealed that heterotic hybrids for pod yield did not show all component characters in common. In fact, appreciable heterosis for one or two components was sufficient to manifest heterosis for pod yield. The high heterotic effects of pod yield in these cases for mainly with the significant heterotic effects of number of mature pods per plant, kernel yield and harvest index (Table 2-4). The hybrids K-134 x JUG-43, K-134 x JL-24 and JAL-6 x JL-24 were found high heterotic hybrids for pod yield. They also had high heterosis for many yield attributing traits in desirable directions and these hybrids offer best possibilities of future exploitation for development of high yielding drought tolerant varieties.

REFERENCES

Dwivedi, S.L. *et al*. (1998). *Ann. Appl. Biol*. **133:** 237-244.

Jayalakshmi,V. *et al.* (2000). *Legume Res*. **23**: 102-105.

Manivel,P. *et al*.,(2003). *J. Oilseeds Res*. **20:**116-117.

Mothilal Nallathambi, G. and Sankara Pandian, R.(2004). **In:**. National Symposium " Enhancing Productivity of Groundnut for Sustaining Food and Nutritional Security" at NRCG , Junagadh, pp.7-8.

Pallas,J.E.(1982). *Peanut Sci*. **9** :14-17.

Parmar, D.L. *et al.* (2004**). In:** National Symposium " Enhancing Productivity of Groundnut for Sustaining Food and Nutritional Security" at NRCG , Junagadh, pp.15-16.

Rudraswamy, P. *et al,.* (1999) L.). *Mysore J. Agric. Sci*. **33**(2**):** 248-252.

Varman, P. V. (2000). *Madras Agric. J.* **87**(6-9): 462-466.

Varman, P. V. and Raveendran, T.S.(1994) *Madras Agric. J.* **87**(6-9):529-532.

Vasanthi, R. P. and Raja Reddy, C.(2002). *J. Res. ANGRAU*. **30**(2): 137-142.