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Genetic Variability, Heritability, Correlation and Regression in F_3 and F_4 Segregating Generation for Traits Related to WUE and Yield in the Cross NRCG 12274 × ICG 12370 of Groundnut (*Arachis hypogaea* L.)

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A B S T R A C T

F_3 and F_4 segregating generation has been evaluated during *kharif* 2012 and *summer* 2013 respectively in the augmented design along with parents and check. Estimate the variability, heritability, intergeneration correlation and regression across F_3, F_4, F_5 and F_6 generation during, *kharif* 2013 and *summer* 2014 respectively. Results revealed that presence of higher PCV and GCV for all the characters in all the four generations further, high heritability coupled with high genetic advance was observed for most of the traits indicates involvement of additive gene action in controlling of these traits. Presence of significant positive correlation between F_4 to F_5 and F_5 to F_6 for pods per plant, pod yield per plant, kernel yield per plant, kernels per plant, SCMR and SLA implies the these traits can be used as a selection criteria from F_4 generation onwards.

Introduction

Groundnut (*Arachis hypogaea*) is one of the world important oilseed crop grown mainly in the arid and semiarid region were occurrence of drought is very frequent therefore productivity of the crop in the world and India are been declining. Hence, increasing the yield under the drought is an important breeding objective for the groundnut breeder. Further, identification of genotypes that have a greater ability to use limited available water to enhance productivity of the crop hence Water Use Efficiency (WUE) is one such important trait available to the breeder to augment the yield under drought environment. However WUE is quantitative characters governed by many genes with small effect coupled with high environmental effect therefore traits related to WUE would be an important traits for the breeder to enhance the WUE coupled with high yield hence Specific Leaf Area (SLA) and Soil Plant Analysis development (SPAD) Chlorophyll Meter Reading (SCMR) are been used in the study. Further results from the previous study on SLA have shown the consistent and significant inverse correlation of WUE and yield. However SCMR shown the positive association with WUE and yield (Farquar *et al.*, 1989; Wright, 1994; Nageshwara Rao *et al.*, 2001).

Breeders very often use segregating populations as source population to exercise selection for identifying homozygous lines with better performance to develop varieties. At the same time, the breeding lines from the advanced generations are also used as parental lines for developing commercially exploitable heterotic hybrids. But, most often the source of early generations *i.e.*, F_3, F_4, F_5 and F_6 segregating populations offer wider opportunities for achieving high success, because of wider genetic base.

Materials and Methods

For developing superior segregants for high pod yield with high water use efficiency the genotypes such as NRCG12274 and ICG 12370 were selected. These genotypes are enough diverse for traits related to pod yield and WUE. Hybridization was made between these two genotypes to develop F_1 hybrid, selfing upon these hybrids was made get F_2 plants and all F_2 plants were forwarded to get F_3 progenies. As a procedure of plant to row progeny method 108 F_3, 84 F_4, 72 F_5 and 52 F_6 along with parents and checks were sown during *kharif* 2012, summer 2013, *kharif* 2013 and summer 2014 respectively. All recommended agronomic practices and plant protection measures were followed during the crop growth period of ever segregating generation to ensure better growth and yield. The observations were recorded on all the plants in all the four segregating generation.

The genotypic and phenotypic co-efficient of variations was computed as suggested by Robinson *et al.,* (1949). Heritability and genetic advance were worked out as per the method outlined by Hanson *et al.,* (1956). Correlation co-efficient of each character between two generations was found out by calculating the phenotypic correlation coefficient exactly as described under taking the same character in both the generations. Narrow sense heritability estimates were made based on the regression of F_4 on F_3, F_5 on F_4 and F_6 on F_5 generation using the following formula (Cahaner and Hillet, 1980).

Results and Discussion

Analysis of Variance for growth, traits related to WUE and yield attributing traits F_3, F_4, F_5 and F_6 segregating generations

Analysis of variance in F_3, F_4, F_5 and F_6 segregating populations of the cross NRCG12374 × ICG12370 revealed significant differences (Table 1) among the lines in all the four generations for all the characters except shelling percentage in F_3, F_4 and F_6 generations. Further, segregating progenies and checks also recorded presence of high variability for all the characters in all the four generations, which indicating the presence of enormous genetic variability and the choice of the material for the investigation is appropriate. This was further supported by the fact that range has been also quite wider for all the characters pointing out extreme segregates are found in population for selection.

Genetic variability parameters

Higher GCV and PCV has been observed (Table 2) for plant height, SCMR, total number of pods per plant, pod yield per plant, number of kernels per plant and kernel yield per plant in F_3, F_4, F_5 and F_6 generations. Similar findings of higher estimates of GCV & PCV for pods per plant, kernel yield per plant and pod yield per plant were observed by Sharma & Varshney (1995), Sumathi & Ramanathan (1995), Gowda *et al.,* (1996), Makhan lal *et al., (*2003), Golkia *et al.,* (2005), Ganeshan and Sudhakar (1995) Veeramani *et al., (*2005), John *et al.,* (2007) and Parameshwarappa *et al.,* (2007) in groundnut.

Table.1 Analysis of variance for growth parameters, traits related to WUE, yield and its component characters in four segregating generations (F_3, F_4, F_5 and F_6) of the cross NRCG12274 × ICG12370 in groundnut

Source of variance		Df	Days to Flowering	Plant height (cm)	Primary branches/ plant	SLA (cm^2/g)	SCMR	Pods/plant (g)	Pod yield/ plant (g)	Kernels/ plant	Kernel yield/ plant (g)	Shelling Percentage
Block (eliminating Check + Va.)	F_3	4	71.62**	11.76	0.44	2046.67	30.06	26.38	34.12	36.77	4.071	50.46*
	F_4	4	3.09	3.93*	0.04	406.88	23.23*	35.39*	19.74**	22.37**	1.17	42.49*
	F_5	3	40.81*	20.25	0.03	1584.29	91.12*	24.08*	5.06	46.20	4.06	13.13
	F_6	3	11.33	1.41	0.01	282.23	23.63**	4.08	20.07	33.01	2.66	2.53
Progenies + Checks	F_3	110	58.55**	29.76*	0.32	5035.69*	288.17**	112.90**	200.71*	374.93**	76.1339	169.92
	F_4	86	50.84*	25.23**	0.57**	4957.34*	242.15*	93.22**	134.99**	288.99**	62.95**	93.54**
	F_5	78	48.00**	28.36*	0.67*	5275.84*	180.33**	79.80**	164.04**	242.40*	53.84*	107.01
	F_6	54	34.00*	19.36**	0.30**	6333.72**	103.56**	196.64**	177.947**	479.91**	125.59**	163.13**
Checks	F_3	3	37.51**	43.57**	0.77*	1161.24**	97.47*	115.20**	146.38	167.67**	111.83	126.31
	F_4	3	37.22*	15.28**	0.01	6314.86*	226.89*	103.85**	104.81**	135.63**	71.91**	54.30*
	F_5	3	48.00*	57.70	0.02	4105.19*	70.69*	124.62**	127.50**	382.04*	155.59**	367.39*
	F_6	3	20.58	13.01**	0.76**	2210.08	35.41	94.24**	131.05*	260.09*	66.48	392.55**
Progenies	F_3	107	59.44**	29.78*	0.31	4956.89*	293.88**	113.83**	203.64*	362.12**	76.08	172.18
	F_4	83	51.60*	25.77**	0.28**	4867.23*	245.26*	93.71**	137.30**	294.31**	63.03**	95.29**
	F_5	71	48.44**	17.64*	0.28	5338.97*	186.40**	79.378**	167.19**	240.34*	51.06*	100.28
	F_6	51	35.86*	19.46**	0.28**	4978.61**	109.40**	138.42**	141.75**	368.80**	82.50**	86.11**
Checks *vs* Progenies	F_3	1	8.25*	0.21	0.21	6520.99	75.78*	11.53*	4.64	69.12*	9.80	21.39
	F_4	1	15.00	0.72	25.34**	9722.17*	14.81	31.01*	3.29	153.62**	37.94**	26.09
	F_5	1	20.68	0.23	26.55**	3703.11	22.93	16.46*	41.92*	90.81	22.42	3.73
	F_6	1	6.18	0.31**	26.74**	8809.51**	11.70	33.39**	21.51**	86.08**	25.30**	32.51**
Error	F_3	4	0.52	2.29	0.11	641.97	6.28	1.11	26.81	13.71	24.04	30.99
	F_4	4	5.01	0.41	0.01	663.00	23.43	3.84	1.03	5.42	1.78	4.48
	F_5	4	2.84	18.35	0.11	546.66	7.49	1.91	5.38	21.66	7.50	22.60
	F_6	6	5.58	0.98	0.02	355.63	2.29	4.08	14.64	27.50	2.36	1.56

*Significant @ P =0.05 ** Significant @ P = 0.01

Table.2 Genetic variability parameters for growth, traits related to WUE, yield and its component traits in four segregating generations (F_3, F_4, F_5 And F_6) of the cross NRCG12274 × ICG12370 in groundnut

CHARECTERS		MEAN	RANGE		GCV (%)	PCV (%)	h^2_{bs}(%)	GAM
			MIN	MAX				
Days to first flowering	F_3	39.08	20.55	48.80	19.01	19.10	99.06	38.98
	F_4	39.61	23.77	44.80	16.55	17.49	89.56	32.26
	F_5	37.07	25.71	49.80	17.27	17.86	93.51	34.40
	F_6	35.13	30.25	42.15	14.44	15.93	82.17	26.96
Plant height (cm)	F_3	20.50	12.00	36.23	24.76	25.84	91.84	48.87
	F_4	18.89	12.60	42.94	25.60	25.83	98.27	52.28
	F_5	19.91	12.60	29.80	23.43	25.78	82.59	43.86
	F_6	22.28	14.28	32.25	17.79	18.34	94.17	35.56
Primary branches/plant	F_3	5.27	4.06	6.49	8.28	10.42	63.15	13.54
	F_4	5.09	3.25	6.36	9.97	10.18	95.91	20.11
	F_5	5.21	4.11	6.20	7.53	9.82	58.72	11.87
	F_6	4.53	3.41	5.48	10.47	10.93	91.84	20.68
SLA (cm^2/g)	F_3	199.31	89.65	365.26	31.90	34.34	86.30	61.04
	F_4	211.82	93.25	312.05	29.40	31.81	85.40	55.96
	F_5	239.47	95.32	365.23	27.40	29.09	88.74	53.17
	F_6	243.58	102.13	385.26	25.73	26.87	91.70	50.85
SCMR	F_3	44.83	11.95	89.98	36.62	37.04	97.72	74.56
	F_4	41.49	22.56	78.57	34.48	36.40	89.72	67.27
	F_5	34.74	14.43	77.73	36.50	37.34	95.55	73.48
	F_6	31.18	13.88	68.87	30.60	30.98	97.55	62.26
Pods /Plant	F_3	26.83	11.92	62.00	38.30	38.50	98.96	78.48
	F_4	27.86	15.39	71.00	32.68	33.43	95.57	65.8
	F_5	28.17	15.39	55.00	29.61	30.02	97.33	60.18
	F_6	40.95	13.22	67.22	26.09	26.55	96.55	52.82
Pod yield/plant (g)	F_3	31.27	10.14	94.48	41.17	44.38	86.04	78.67
	F_4	30.29	12.63	57.50	37.01	37.16	98.18	75.92
	F_5	35.27	12.63	63.84	34.19	34.82	96.43	69.16
	F_6	28.17	15.39	62.00	29.61	30.02	97.33	60.18
Kernels/plant	F_3	48.59	18.23	98.29	37.01	37.20	98.95	75.83
	F_4	51.03	27.73	95.72	31.99	32.31	98.01	65.23
	F_5	52.86	28.16	89.00	26.52	27.94	90.07	51.84
	F_6	62.50	22.66	116.97	27.25	28.51	91.34	53.65
Kernel yield/plant(g)	F_3	21.00	8.45	45.02	33.26	40.64	66.97	56.06
	F_4	21.39	11.25	43.48	35.14	35.69	96.94	71.27
	F_5	21.09	10.43	42.50	29.67	32.39	83.93	55.99
	F_6	29.64	10.23	53.56	27.84	28.32	96.65	56.39
Shelling percentage	F_3	66.76	44.18	95.80	17.23	19.14	81.02	31.94
	F_4	66.25	44.25	85.41	13.81	14.18	94.25	27.72
	F_5	57.00	40.29	83.12	14.66	16.87	75.54	26.24
	F_6	75.59	46.77	86.46	11.21	11.33	97.88	22.85

Table.3 Phenotypic correlation coefficients among growth parameters, traits related to WUE, yield and its component traits in four segregating generations (F_3, F_4, F_5 and F_6) of the cross NRCG12274 × ICG12370 in groundnut

Characters	Generations	Pods /plant	Kernels / plant	Kernel yield/ plant (g)	Shelling percentage	SLA (cm_2/g)	SCMR	Pod yield (g)
Pods / plant	F_3	**1.00**	0.93**	0.94**	0.20*	-0.24*	0.28*	0.84**
	F_4	**1.00**	0.93**	0.89**	0.07	-0.45**	0.55**	0.83**
	F_5	**1.00**	0.94**	0.81**	0.01	0.59**	-0.34*	0.81**
	F_6	**1.00**	0.71**	0.95**	0.54**	-0.70	0.79**	0.87**
Kernels / plant	F_3		**1.00**	0.91**	-0.03	-0.23*	0.26*	0.89**
	F_4		**1.00**	0.89**	-0.25*	-0.53**	0.63**	0.89**
	F_5		**1.00**	0.75**	-0.10*	0.62**	-0.35*	0.79**
	F_6		**1.00**	0.76**	0.30*	-0.58**	0.66**	0.73**
Kernel yield / plant (g)	F_3			**1.00**	0.15*	-0.26*	0.29*	0.92**
	F_4			**1.00**	-0.11*	-0.52**	0.61**	0.94**
	F_5			**1.00**	0.17*	0.59**	-0.38*	0.86**
	F_6			**1.00**	0.40**	-0.78**	0.86**	0.97**
Shelling percentage	F_3				**1.00**	0.01	-0.01	-0.18*
	F_4				**1.00**	0.32*	-0.31*	-0.37*
	F_5				**1.00**	-0.09	-0.05	-0.12*
	F_6				**1.00**	-0.23*	0.25*	-0.23*
SLA (cm_2/g)	F_3					**1.00**	-0.88**	-0.24*
	F_4					**1.00**	-0.72**	-0.55**
	F_5					**1.00**	-0.56**	-0.64**
	F_6					**1.00**	-0.92**	-0.81**
SCMR	F_3						**1.00**	0.27*
	F_4						**1.00**	0.63**
	F_5						**1.00**	0.39*
	F_6						**1.00**	0.88**
Pod yield / plant (g)	F_3							**1.00**
	F_4							**1.00**
	F_5							**1.00**
	F_6							**1.00**

*Significant @ P =0.05 ** Significant @ P = 0.01

Table.4 Intergeneration correlation coefficients for growth parameters, traits related to WUE, yield and its component traits from F_3 to F_6 segregating generations of the cross NRCG12274 × ICG12370 in groundnut

Characters	Generations	F_3	F_4	F_5	F_6
Days to flowering	F_3	**1.00**	0.53**	-0.15	0.07
	F_4		**1.00**	0.48**	0.45**
	F_5			**1.00**	0.54**
	F_6				**1.00**
Plant height (cm)	F_3	**1.00**	0.58	0.02	0.12
	F_4		**1.00**	0.61**	0.35*
	F_5			**1.00**	0.19
	F_6				**1.00**
Primary branches/plant	F_3	**1.00**	0.20*	0.23*	-0.07
	F_4		**1.00**	0.35*	0.28*
	F_5			**1.00**	0.17*
	F_6				**1.00**
Pods/ plant	F_3	**1.00**	0.40**	-0.01	0.06
	F_4		**1.00**	0.48**	0.13
	F_5			**1.00**	0.97**
	F_6				**1.00**
Kernels/ plant	F_3	**1.00**	0.32*	-0.01	0.14
	F_4		**1.00**	0.57**	0.04
	F_5			**1.00**	0.84
	F_6				**1.00**
Kernel yield / plant (g)	F_3	**1.00**	0.17*	0.08	0.08
	F_4		**1.00**	0.42**	0.04
	F_5			**1.00**	0.85**
	F_6				**1.00**
Shelling per cent age	F_3	**1.00**	0.46**	0.21*	0.03
	F_4		**1.00**	0.38*	0.21*
	F_5			**1.00**	0.03
	F_6				**1.00**
SLA (cm^2/g)	F_3	**1.00**	0.41**	-0.20	0.15
	F_4		**1.00**	0.37	0.08
	F_5			**1.00**	0.15
	F_6				**1.00**
SCMR	F_3	**1.00**	0.41**	-0.07	0.08
	F_4		**1.00**	0.47**	0.07
	F_5			**1.00**	0.72**
	F_6				**1.00**
Pod yield / per plant (g)	F_3	**1.00**	0.32*	0.08	0.06
	F_4		**1.00**	0.26	0.02
	F_5			**1.00**	0.76**
	F_6				**1.00**

Table.5 Correlation and regression of pod yield on growth parameters, traits related to WUE and yield component traits in four segregating generations of the NRCG12274 × ICG12370 in groundnut

Characters	F_3 generation		F_4 generation		F_5 generation		F_6 generation	
	r-value	b-value	r-value	b-value	r-value	b-value	r-value	b-value
Days to first flowering	-0.09	-0.09	0.17*	0.30	0.06	0.12	0.01	0.22
Plant height (cm)	-0.04	-0.11	-0.15*	-0.38	0.15*	0.37	-0.12*	-0.84
Primary branches/ plant	0.07	2.11	-0.01	-0.03	0.07	1.89	0.09	-0.04
SLA (cm^2/g)	-0.66**	-0.13	-0.53**	-0.09	-0.63**	-0.11	-0.35*	1.11
SCMR	0.68**	0.57	0.56**	0.44	0.65**	0.61	0.94**	-0.14
Pods / plant	0.62**	0.83	0.74**	0.94	0.68**	0.98	0.95**	0.93
Kernels / plant	0.69**	0.52	0.70**	0.50	0.07	0.01	0.97**	0.59
Kernel yield / plant (g)	0.57**	0.94	0.59**	0.86	0.65**	1.17	0.98**	1.14
Shelling percentage	-0.17*	-0.19	-0.11*	-0.15	-0.43**	-0.56	-0.03	-0.27

* Significant @ P=0.05 ** Significant @ P= 0.01

Table.6 Comparison between broad sense and narrow sense heritability for growth parameters, traits related to WUE, yield and its component traits in segregating populations for four generations in the cross of NRCG12274 × ICG12370 in groundnut

Characters	F_3-F_4		F_4-F_5		F_5-F_6	
	Broad sense heritability	Narrow sense heritability	Broad sense heritability	Narrow sense heritability	Broad sense heritability	Narrow sense heritability
Days to first flower	89.56	37.02	93.51	41.16	82.17	43.68
Plant height (cm)	98.27	38.02	82.59	55.74	94.13	46.80
Primary branches/plant	95.91	14.42	58.72	27.77	91.84	13.41
Pods /plant	95.57	26.57	97.33	34.51	96.55	27.82
Kernels / plant	98.01	20.01	90.07	37.74	91.34	37.59
Kernel yield / plant (g)	96.94	11.51	83.93	27.58	96.65	57.39
Shelling percentage	94.25	26.71	75.54	37.96	97.88	46.88
SLA (cm^2/g)	85.40	30.86	88.74	32.43	91.70	18.74
SCMR	89.72	28.54	95.55	35.19	97.55	49.91
Pod yield/ plant (g)	98.18	20.92	96.43	20.07	88.07	40.66

Table.7 Performance of superior segregants for growth, traits related to WUE, yield and yield component traits in F_6 segregating generations of the cross NRCG12274 × ICG12370 in groundnut

Line no	Days to first flowering	Plant height (cm)	Primary branches/ plant	SLA (cm^2/g)	SCMR	Pods/plant	Kernels/plant	Pod yield/plant (g)	Kernel yield/plant (g)	Shelling percentage
13A1A1	30.35	25.23	5	156.25	45.25	45	71	38.59	20.12	52.14
23B1A1	33.75	20.25	6	145.25	49.25	62	84	46.91	38.23	81.63
32A1A1	42.73	18.65	7	123.25	54.21	59	93	53.77	43.63	80.92
40A1A1	39.79	32.20	5	145.25	40.23	56	99	69.64	34.27	49.21
52A1A1	43.71	18.25	4	165.25	39.25	44	93	53.25	33.19	62.32
60A1A1	35.00	33.25	8	176.25	47.21	50	88	61.43	28.13	45.79
63A1A1	30.57	25.20	5	142.65	56.25	52	90	50.18	40.12	79.95
73A1A1	29.64	15.20	6	132.25	62.32	48	84	48.25	29.38	60.88
83A1A1	32.27	26.36	4	165.25	48.25	53	80	48.41	40.31	83.26
96A1A1	40.64	33.25	7	125.23	50.12	63	98	60.03	49.42	83.00
98A1A1	44.00	18.20	5	175.42	48.56	59	64	44.12	33.19	75.22
101A1A1	42.21	29.25	6	125.23	52.32	63	76	52.21	38.56	73.85
NRCG12274	45.00	30.25	5	174.25	30.20	36	68	35.23	29.12	82.65
ICG12370	44.45	18.25	4	201.25	25.32	20	39	25.36	20.12	79.38
TMV-2	39.36	36.25	6	142.25	36.25	28	55	25.23	16.25	64.47
KCG-2	44.60	25.20	5	125.56	42.36	32	59	36.25	26.25	72.44

Heritability and Genetic Advance as Per cent mean

High heritability coupled with high genetic advance as *per cent* of mean was observed (Table 2) for high for yield and its attributing traits like pods per plant, shelling percentage, kernel yield per plant. It indicates the presence of additive gene action.

Hence, single plant selection could be effectively made as environment does not have any influence in the variation of traits. Similar result was reported by Reddy and Guptha (1992), Ganeshan and Sudhakar (1995), Mukhan *et al.,* (2003) and Praveen Kumar (2004) in groundnut.

Correlation of pod yield per plant with growth parameters, traits related to WUE and yield component characters

Phenotypic correlation coefficients studies revealed that (Table 3) pod yield per plant had strong positive correlation with pods per plant, kernels per plant, kernel yield per plant and SCMR in F_3, F_4, F_5 and F_6 segregating generations indicating that improvement pods per plant, kernel yield per plant, SCMR will leads to improvement in yield.

These results are in agreement with the results of Sharma and Varsheny(1995), Moinuddin (1996) and also Singh(1999), Sabeta (2000), Nagda *et al., (*2001), Mahalakshmi *et al.*, (2005), Kalmeshwar *et al.*, (2006), John *et al., (2007)*, Mane *et al.*, (2008), Sudhir *et al.,*,. (2008) in groundnut. Significant negative association of pod yield per plant with days to flowering and shelling percentage and SLA was observed in F_3, F_4, F_5 and F_6 segregating populations studied. Indicates that negative relationship of pod yield per plant with SLA, selection for high yielding and water use efficient segregates can be done in a single selection programme.

Intergeneration correlation and regression studies

Significant and positive correlation was obtained (Table 4) between F_3 to F_4, F_3 toF_5 and F_3 to F_6 generations for days to flowering, plant height and primary branches per plant which indicating that prediction would be made from F_3 generation and theses trait are mostly governed by additive gene action and suitability of these traits for selection in individual plant basis in the advanced generations of segregating progenies. These findings were supported by Kulkarni *et al.*, (1976) and Reddy *et al.*, (1985). They also find the existence of significant correlation between F_3 to F_4 and F_3 to F_5 for plant height in okra.

Significant and positive correlation were obtained for F_4 to $F_{5,}$ F_4 to F_6 and F_5 to F_6 for pods per plant, kernels per plant, pod yield per plant, kernel yield per plant, SCMR and SLA. This indicated that prediction can be made for these characters from F_4 generation to identify the lines that will give higher pod yield and higher water use efficiency.

Comparison between correlation and regression for growth parameters, traits related to WUE and yield component traits in F_3, F_4, F_5 and F_6 segregating generations

Kernel yield per plant, pods per plant, kernels per plant and SCMR consistently showed (Table 5) the positive correlation and positive effect in all the four segregating generations. Hence selection for these traits could be excisesed to develop high yielding with high water use efficient genotypes. Similar conclusion were made by Varsheny (1995) Moinuddin (1996) and also Singh (1999), Sabeta (2000), Nagda *et al., (*2001), Mahalakshmi *et al.*, (2005), Kalmeshwar *et al.*, (2006), John *et al., (2007)*, Mane *et al.*, (2008) and Sudhir *et al.*, (2008) in groundnut.

Whereas other traits like, SLA and shelling percentage showed negative association and negative effect on pod yield per plant in of all the four generations.

Comparison of narrow sense and broad sense heritability for growth parameters, traits related to WUE and yield component traits in F_3, F_4, F_5 and F_6 segregating generations

High broad sense heritability was observed (Table 6) for all the characters in F_3, F_4, F_5 and F_6 segregations populations for all the characters indicating that presence of high magnitude of genetic variability for the characters.

High narrow sense heritability was observed for days to flowering, number of pods per plant, kernels per plant kernel yield per plant, SLA, SCMR and shelling percentage in F_6 segregating population, which indicates that these characters were governed by additive variance. Therefore, selection will be effective for such traits based on phenotypic observations.

Selected superior segregants in F_6 segregating generations

Top high yielding progenies were selected from F_6 segregating populations based on important traits like SCMR, SLA, pods per plant, kernels per plant, kernel yield per plant, pod yield per plant and shelling percentage. From the selection it was observed that (Table 7) high yielding progenies are having higher SCMR coupled with lower SLA value and higher pod yield per plant. Since, these progenies were still segregating hence one more generation need to be test to predict their performance before releasing for either station trial or multi location trail.

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