International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 01 | Jan 2020 www.irjet.net p-ISSN: 2395-0072

TRANSGRESSIVE SEGREGATION STUDIES FOR HIGH SHELLING PERCENTAGE IN SUMMER GROUNDNUT (ARACHIS HYPOGAEA L.)

Dr. Sharad Pawar[1], Dr. Vikram Jambhale[2] and Mr. Vijaykumar Raut[3]

[1,2,3]Mahtam Phule Krishi Vidyapeeth, Rahuri Dist: Ahmednagar 413 722(M.S.)

ABSTRACT: Two F_2 crosses *viz*. IGSC-11 x SB-XI and TAG-24 x SB-XI were evaluated during summer 2017 season in Randomized Block Design with three replications .Transgressive segregants in desirable direction were observed for all characters in F_2 generation of two crosses. In general the highest proportion of transgressive segregants were recorded for shelling percentage (44 in cross 1 and 88 in cross 2), followed by dry pod yield per plant (g), number of mature pods per plant, oil (%), protein (%), dry haulm yield (g), 100 kernel weight (g) and sound mature kernel (%). On the basis of performance of transgressive segregants, it was concluded that, when the desired intensity of a character is not available in the parents, transgressive breeding can be successfully used to extend the limit of expression of character. This could be possible by accumulation of favorable plus genes, in a hybrid derivatives from both parents involved in hybridization. The most promising transgressive segregants *viz.,* plant No.246 of ICGS-11 x SB-XI and plant No.297 of TAG-24 x SB-XI transgressed number of mature pods per plant in addition to the higher expression of other three or four characters than the increasing parent. They produced 23.72 (ICGS-11 x SB-XI) and 23.94 (TAG-24 x SB-XI) per cent more number of mature pods per plant than their respective increasing parents with highest value for shelling percentage than other segregants.

INTRODUCTION:

Groundnut (*Arachis hypogaea* L.) is also called as peanut or monkey nut is an important monoecious annual legume crop of mainly semiarid tropics region of the world, and grown for high quality edible oil, protein, food and animal feed. Groundnut seeds are a nutritional source of vitamin E, niacin, calcium, phosphorus, magnesium, zinc, iron, riboflavin, thiamin and potassium. The crop accounts for near about 45 per cent of total area under oilseed and 55 per cent of the oilseed produced in the country. India is the second in production of groundnut after China. It is planted on more than 25 million hectares worldwide and produced more than 42 million tonnes in 2016 and the production of peanut is increasing.

Groundnut or peanut is commonly called the poor's man nut. Groundnut seeds contain about 50 per cent edible oil and 25 per cent protein. About 80 % is used for oil extraction and a small proportion is consumed as roasted, salted or fried nuts or as meal in various recipes.

Groundnut belongs to C_3 plant, it needs good sunshine and high temperature to produce more pods. Therefore summer is the ideal season for groundnut cultivation wherever irrigation facilities are available. The average total dry matter produced per plant in bunch groundnut at harvest is 25.70 per cent in summer season (Ong, 1986). Production of transgressive segregants for yield and its components like dry pod yield, harvest index and mature pod number, plays a vital role in breeding programme. Although transgressive segregants includes lines which fall outside the range of performance of either parents, but only those being superior to better parents in desirable direction are of practical value. Therefore, a breeder is more concerned with obtaining higher frequency of transgressive segregants in segregating population, as it provides a better scope for exercising selection to improve productivity.

REVIEW OF LITERATURE:

Muhammed Azharudheen (2010) reported a higher percentage of the superior segregants for rust resistance in the cross involving a Virginia parent of groundnut (TG 19), whereas, the cross involving a Spanish bunch parent of groundnut (TG 49) revealed high percentage of superior segregants for late leaf spot, productivity and quality traits. The presence of transgressive segregants in both directions indicated contribution of favourable alleles from both the parents.

Singh *et al*. (2010) evaluated thirty two groundnut genotypes of both spreading and bunch types for their yield, yield attributes, seed protein and oil content to analyse the degree of genetic variability in quantitative and qualitative traits. This degree of variation in seed yield and quality traits offer an opportunity to further evolve the promising groundnut varieties to boost both the seed and oil production in the country.

Bagal (2016), observed transgressive segregants for all characters in each of three crosses in F_2 of groundnut. The most promising transgressive segregants *viz.* plant No. 45 of Phule Unnati x TPG-41, plant No. 222 of Phule 6021 x RHRG 6110, plant No. 111 of Phule Unnati x SB XI transgressed grain yield per plant in addition to the higher expression of other three or four character than the increasing parent. They produced 76.79 (Phule 6021 x RHRG 6110) 66.52 (Phule Unnati x SB XI) and 46.77 (Phule Unnati x TPG 41) per cent more dry pod yield per plant (g) than their respective increasing patents.

Shreya and Vasanthi (2017), identified transgressive segregants in four crosses of groundnut for SCMR (SPAD Chlorophyll meter reading), SLA (specific leaf area), total biomass per plant, shoot weight per plant, root weight per plant, shelling out-run per plant, harvest index per plant, pod yield per plant and kernel yield per plant. All the character under study showed transsgressive segregation.

MATERIAL AND METHODS:

The material used in the present study consisted of two crosses of groundnut. These two crosses involving two females' *viz*., ICGS-11 and TAG-24 and one male *viz.* SB-XI observed to be promising were selected for this investigation. The crosses were obtained from the Groundnut Breeder, All India Co-ordinated Research Project, on Groundnut, M.P.K.V. Rahuri.

The parents and F_2 generations of two crosses for the transgressive segregation were used for conducting an experiment during summer-2017. Statistical analysis was performed as per the method proposed by Panse and Sukhatme (1967). Statistical parameters were calculated for presentation of data on different quantitative attributes.

Details of two F_2 crosses of groundnut for transgressive segregation.

Generation	Cross-1	Cross-2
P_1	ICGS-11	TAG-24
P_2	SB-XI	SB-XI
F_2 (self of F_1)	ICGS-11 x SB-XI	TAG-24 x SB-XI

RESULTS AND DISCUSSION:

Table 1: Threshold value, frequency and range values of transgressive segregants for eight agronomic characters of the cross ICGS-11 x SB-IX

Sr. No.	Characters	Threshold value	Transgressive segregation F_2	
			Frequency	Range
1.	Number of mature pods/ plant	29.22	73	9.00-33.00
2.	Dry haulm yield/plant (g)	32.56	59	12.00-51.00
3.	Dry pod yield/plant (g)	23.53	74	9.00-33.00
4.	100 kernel weight (g)	35.90	65	28.66-43.52
5.	Shelling (%)	70.97	44	63.39-72.22
6.	Sound mature kernel (%)	94.16	61	85.00-98.00
7.	Oil (%)	48.18	69	44.22-51.36
8.	Protein (%)	24.55	32	20.24-25.36

Table 2: Threshold value, frequency and range in values of transgressive segregants for eight agronomic characters of the cross TAG-24 x SB-IX

Sr. No.	Characters	Threshold value	Transgressive segregation F_2	
			Frequency	Range
1.	Number of mature pods/ plant	24.19	45	10.00-31.00
2.	Dry haulm yield/plant (g)	29.86	66	10.00-51.00
3.	Dry pod yield/plant (g)	22.31	37	9.00-28.00
4.	100 kernel weight (g)	33.51	59	27.15-35.85

5.	Shelling (%)	70.23	88	66.39-72.31
6.	Sound mature kernel (%)	94.02	43	87.00-98.00
7.	Oil (%)	48.53	39	45.12-49.87
8.	Protein (%)	25.13	68	20.25-26.39

Table 3. Ranking of F_2 generation based on proportion of the transgressive segregants for different characters in two crosses

Sr. No.	Characters	Cross No.	Increasing parent	F_2	Rank
1.	Number of mature pods/plant	1	ICGS-11 (+)	27.93	1
		2	SB-XI (+)	19.86	2
2.	Dry haulm yield/plant	1	ICGS-11 (+)	27.19	1
		2	SB-XI (+)	19.86	2
3.	Dry pod yield/plant (g)	1	SB-XI (+)	21.20	1
		2	SB-XI (+)	15.52	2
4.	100 kernel weight (g)	1	ICGS-11 (+)	34.15	1
		2	SB-XI (+)	31.95	2
5.	Shelling (%)	1	SB-XI (+)	69.07	2
		2	SB-XI (+)	69.09	1
6.	Sound mature kernel (%)	1	ICGS-11 (+)	92.04	1
		2	TAG-24 (+)	91.81	2
7.	Oil (%)	1	ICGS-11 (+)	47.77	1
		2	SB-XI (+)	47.29	2
8.	Protein (%)	1	SB-XI (+)	23.34	1
		2	SB-XI (+)	23.30	2

Table 4 : The upper most limits achieved by transgressive segregants in respect of various characters in two F_2 crosses *viz.* ICGS-11 x SB-XI and TAG-24 x SB-XI

Sr. No.	Characters	Highest intensity of characters expression in two crosses	
		Cross-1 (ICGS-11 x SB-XI)	Cross-2 (TAG-24 x SB-XI)
1.	Number of mature pods/plant	40.00 (22.40)	31.00 (20.17)
2.	Dry haulm yield/plant (g)	51.00 (25.47)	51.00 (25.38)
3.	Dry pod yield/plant (g)	33.00 (18.70)	28.00 (18.23)
4.	100 kernel weight (g)	43.52 (32.00)	35.85 (30.96)
5.	Shelling (%)	72.22 (69.05)	72.13 (68.84)
6.	Sound mature kernel (%)	98.00 (90.97)	98.00 (90.33)
7.	Oil (%)	51.36 (46.12)	49.82 (46.90)
8.	Protein (%)	25.36 (22.66)	26.39 (23.21)

*Figures in the bracket are the mean values of increasing parent for respective characters.

Table 5. Promising transgressive segreagants having combinations of desirable attributes

Characters	Plant No.	NMP	DHY	DPY	100 K	SH (%)	SMK (%)	Oil (%)	Protein (%)	% yield increased over increasing parent
Cross-1 : ICGS-11 x SB-XI										
F_2	246	28	34.00*	18.00	34.24*	72.22*	92.00	46.63*	22.68	23.72
ICGS-11		22.40	25.47	17.60	32.00	66.42	90.97	46.12	22.02	
SB-XI		20.63	25.33	18.70	30.96	69.05	90.17	46.10	22.66	
Cross-2 : TAG-24 x SB-XI										
F_2	297	25.00	35.00*	23.00*	34.58*	72.31*	95.00*	48.11	22.36	23.94
ICGS-11		17.20	21.90	16.80	30.85	67.36	90.30	46.71	22.79	
SB-XI		20.17	25.33	18.33	30.96	68.84	90.10	46.90	23.21	

1. NMP = No. of mature pods
2. DPY = Dry pod yield (g)/plant
3. DHY = Dry haulm yield (g)/plant
4. SMK = sound mature kernel
5. SH %= shelling percentage
6. 100K = weight of 100 kernel (g)

* Intensity of expression of character higher than the increasing parent

The most promising transgressive segregants *viz.,* plant No.246 of ICGS-11 x SB-XI and plant No.297 of TAG-24 x SB-XI transgressed number of mature pods per plant in addition to the higher expression of other three or four characters than the increasing parent. They produced 23.72 (ICGS-11 x SB-XI) and 23.94 (TAG-24 x SB-XI) per cent more number of mature pods per plant than their respective increasing parents with highest value for shelling percentage than other segragants. These transgressants needs to be evaluated further for maintaining consistency in their performance. If they found superior in further generations, they may be identified as improved varieties after adequate evaluation or used in future breeding programme for amulgamation of desired genetic constellations.

REFERENCES:

1. Bagal, K.N. 2016. Studies on assessment of genetic variability for high harvest index in summer groundnut (Arachis hypogaea L.) M.Sc. (Agri) thesis submitted to M.P.K.V. Rahuri *Ong, C.K. 1986. Temperature effects on vegetables and reproductative development. Peanut Crop Science. 24 : 877-882.
2. Panse, V.G. and Sukhatme, P.V. 1967. Statistical methods for Agricultural Workers. ICAR, New Delhi. pp. 359.
3. Shreya Ainminash and Vasanthi, R.P. 2017. Transgrassive segregation study in F_3 population of four groundnut crosses. International J. Current Microbiology and Applied Science. 6(4): 2051-2059.
4. Singh, S., Singh, A.L., Kalpana, S. and Mishra, S. 2010. Genetic diversity for growth, yield and quality traits in groundnut (Arachis hypogaeae L.) Indian J. Plant Physiol. 15(3 N.S.): 267-271.