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SK Tirkey
Deptt. of Genetics & Plant Breeding, Birsa Agricultural University, Ranchi, India

Ekhlaque Ahmad
Krishi Zonal Research Station (*Birsa* Agricultural University), Chianki, Palamau, Jharkhand India

CS Mahto
Deptt. of Genetics & Plant Breeding, Birsa Agricultural University, Ranchi, India

Correspondence
SK Tirkey
Deptt. of Genetics & Plant Breeding, Birsa Agricultural University, Ranchi, India

Genetic variability and character association for yield and related attributes in groundnut (*Arachis hypogaea* L.)

SK Tirkey, Ekhlaque Ahmad and CS Mahto

Abstract
Groundnut is one of the important kharif oilseed crops in India, contributing about 27% of the total area and 33% of the total production of the oilseed crops. It is a rich source of edible oil, high quality protein, fat and carbohydrates. A study to obtain the information on extent of genetic variability and inter-relationship of seed yield and associated characters under rainfed upland condition was carried out at groundnut experimental area of Birsa Agricultural University, Ranchi for two consecutive years (in *kharif* 2014 and 2015). Fifteen advanced lines genotypes including three checks *viz.* Birsa Bold ICGS 76 & Kaushal were laid out in the Randomized Block Design with three replications in rainfed upland situation. Data were recorded for six yield attributing and quality characters in both the years and subjected to pooled analysis. The objectives of this study were to estimate the phenotypic and genotypic variance, genetic advance, heritability, correlation coefficient and path analysis for yield and yield associated traits to identify the most suitable genotypes of groundnut genotypes tolerant to drought for Jharkhand state.

The analysis of variance revealed the significant differences among the genotypes for all the traits indicating presence of sufficient variability among the genotypes for various traits. High estimate of genotypic and phenotypic coefficient of variation were observed for pod yield per plot (18.77 & 24.97), kernel yield per Plot (21.57 & 30.00) and 100 kernel weights (15.07 & 21.19) indicated wider genetic variation for these traits. High value of heritability coupled with high expected genetic advance as per cent of mean were observed for the characters number of pod yield per Plot, Kernel yield per plot and 100-kernel weight indicated that selection may be effective for this character.

The results of correlation studies indicated that genotypic correlation coefficients were higher in magnitude than their corresponding phenotypic correlation coefficients for most of the traits.

Significantly correlation coefficient was existed for pod yield with the Characters Shelling percentage, Kernel yield and 100 Kernel weight. Other Significant correlation was observed between the Characters shelling % and Kernel yield & 100 Kernel weight. High direct effect of path analysis was observed for the Characters shelling percentage. Hence this character may be effective for selection of high pod yield. For maximizing the Pod yield per plant emphasis should be given in selection of characters such as sound mature kernel, kernel yield, Shelling percentage and 100 kernel weight for further improvement of groundnut crop.

Keywords: Genetic variability, groundnut, kharif oilseed crops.

Introduction
Groundnut is one of the important kharif oilseed crops in India, contributing about 27% of the total area and 33% of the total production of the oilseed crops. It is a rich source of edible oil, high quality protein, fat, carbohydrates and good source of all type of vitamin B except vitamin B 12. Jharkhand occupied an area of about 23 thousand hectare, and productivity 1194 kg/ hectare (Argil Dep't. GOJ, 2013-14). Groundnut is unpredictable crop due to its underground pods development. Pod yield is not only polygenic ally controlled but also influence by its component characters. Genetic variability is essential for initiating an effective & successful breeding programme and it became imperative to study the level of genetic variability available in the existing genotype. The study of genetic advance with heritability estimates further clarify the nature of character which can be improved through selection. Correlation study provides an opportunity to study the magnitude and direction of association of yield with its components. Path coefficient is essential to accumulate optimum combination of yield contributing characters and to know the implication of the interrelationship of various characters in a single genotype. Considering this the present study was undertaken to evaluate genotype for yield and its component.

Materials and Method

The experiment was conducted under rainfed situation of Jharkhand at Birsa Agricultural University Experimental Plot, Ranchi during Kharif 2014 and 2015. The experimental material consisting fifteen genotypes including three checks were sown in Randomized Block design (RBD) with three replications. The plot size was maintained at 5m x 2.25m with five rows of 45 cm and plant to plant distance was kept 15 cm. Recommended agronomic practices were followed to raise good crop. Observations were recorded for yield per plot, shelling percentage, kernel yield per plot, days to maturity, 100 kernel weight, Sound mature Kernel percent on net plot area and oil percent. The mean values were used for analysis of variance. Heritability in broad sense and genetic advance were calculated as per Johnson *et al.* The correlation coefficients and path analysis were carried out following the methods of Al-Jibouri *et al.* The data were subjected to statistical analysis using for various genetical parameter using INDOSTAT software.

Table 1: Analysis of Variance of fifteen genotype for seven characters

Source of variation	D F	Pod Yield	Shelling %	Kernel Yield	Days to maturity	100 Kernel Weight	SMK%	Oil%
Replication	7	25056.54	170.51	16675.64	190.77	80.73	19.64	8.04
Treatment	14	273957.97**	113.99**	179038.46**	207.24**	599.02**	24.16*	53.90*
Error	98	24047.36	18.99	18704.16	8.19	65.212	7.20	2.49

Table 2: Mean table of fifteen genotype for seven characters

Sl No.	Entries	Pod Yield		Shelling %	Kernel Yield		Days to maturity	100 Kernel Weight (gm)	SMK %	Oil%
		(gm/ plot)	(Kg/ha)		(gm/ plot)	(kg/ha)				
1	JSP 59	915	1442	72	662	1038	119	59.891	96	50.02
2	RG-592-3	801	1262	**73**	583	909	121	64.502	92	43.13
3	JSSP-50	1259**	1984**	72	909**	1428**	111	58.308	94	42.87
4	PBS 22067	1138*	1793**	71	810*	1273*	116	56.917	96	47.57
5	JSSP 49	873	1376	71	615	977	116	53.167	93	46.68
6	Dh 249	769	1212	67	524	812	119	***43.606***	92	47.68
7	PBS 22066	962	1518	66	635	1001	***122***	48.362	95	43.46
8	PBS 25053	994	1567	70	697	1097	**105**	49.506	93	43.02
9	ICGV 03128	656	1034	61	402	631	115	45.420	94	46.01
10	BG4	1211**	1908**	73	886*	1392**	116	65.472	95	49.35
11	JSP 49	1169*	1841**	67	803*	1233*	114	61.255	92	45.05
12	RG 578	858	1352	71	611	960	122	58.443	93	43.88
13	Kaushal(ZC)	719	1133	***63***	456	714	119	45.585	93	47.06
14	ICGS76 (ZC)	810	1277	67	536	856	107	47.540	97	***41.02***
15	BirsaBold(ZC)	991	1562	70	715	1109	121	66.610	97	46.01
	CV%	16.46		6.33	19.84		2.46	14.89	2.84	3.46
	CD at 0.05	153.86		4.32	135.70		2.83	8.01	2.66	1.56
	CD at 0.01	203.68		5.72	179.63		3.75	10.60	3.52	2.07

Table 3: Estimates of PCV, GCV, Heratability, and Genetic Advance & Genetic Advance as percent of mean for seven characters

Sl No.		PCV	GCV	Heritability	Genetic advance	GA as % of mean
1	Pod Yield	24.97	18.77	56.50	273.68	29.06
2	Shelling %	8.07	5.00	38.473	4.40	6.39
3	Kernel Yield	30.00	21.57	51.72	209.74	31.96
4	Days to maturity	4.95	4.29	75.23	8.91	7.68
5	100 Kernel Weight	21.19	15.07	50.57	11.96	22.07
6	SMK%	3.23	1.54	22.73	1.43	1.51
7	Oil%	6.56	5.56	72.03	4.43	9.73

Table 4: Correlation coefficient among various yield contributing characters.

Characters	Pod Yield	Shelling %	Kernel Yield	Days to maturity	100 Kernel Weight	SMK%
Shelling %	0.550*					
Kernel Yield	0.988**	0.668**				
Days to maturity	-0.250	0.069	-0.204			
100 Kernel Weight	0.571*	0.697**	0.637**	0.158		
SMK%	0.044	0.135	0.085	0.404	0.053	
Oil%	0.220	0.055	0.197	-0.146	0.225	0.011

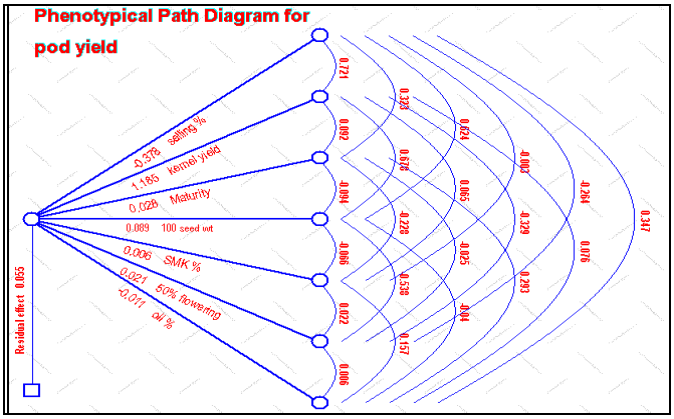

Fig 1: Path Diagram for Pod Yield

Experimental Findings & Discussion

The analysis of variance for all characters revealed highly significant difference among all fifteen genotype for all the characters Pod yield, Shelling percentage, Kernel yield, Days to Maturity, 100 Kernel weight, Sound mature Kernel percentage and oil percentage, indicating the existence of considerable genetic variation among the genotypes (Table; 1).Highest pod yield (1984 kg/ha) & Kernel yield (1428 kg/ha) was recorded in the entry JSSP 50. Four entries JSSP 50, Birsa Groundnut 4, JSP 49 & PBS 22067 were found significantly superior over all three checks (Table - 2).

The component of variance revealed that the phenotypic coefficient of variance were higher than the genotypic coefficient of variance for all the character studied indicating the role of environmental variance in the total variance. The magnitude of PCV and GCV was high for the characters Pod yield, Kernel yield and 100 kernel weight. Similar findings were reported by Zaman *et al* (2011) High heritability along with high genetic advance was observed for the character Pod yield, Kernel yield, 100 Kernel weight and Days to maturity. The same trend was also observed by Savaliya *et al* (2009), John *et al.(2007* and Narsimula *et al. (2012)*

The results of correlation studies indicated that genotypic correlation coefficients were higher in magnitude than their corresponding phenotypic correlation coefficients for most of the traits. Significantly correlation coefficient was existed for pod yield with the Characters Shelling percentage, Kernel yield and 100 Kernel weight. Other Significant correlation was observed between the Characters shelling % and Kernel yield & 100 Kernel weight. High direct effect of path analysis was observed for the Characters shelling percentage. The result were comparable to the result reported by (Paven *et al*, 2014). Hence this character may be effective for selection of high pod yield. For maximizing the Pod yield, emphasis should be given in selection of characters such as sound mature kernel, kernel yield, Shelling percentage and 100 kernel weight for further improvement of groundnut crop.

Path Analysis is used to partition contributing character to yield through direct and indirect effect (Table - 5). As evident from the table that maximum direct effect was recorded by the character kernel yield (1.1846) followed by 100 seed weight (0.0890). High indirect effect was contributed by the character reported by 100 seed weight. Shelling percentage contributed negatively direct and indirect effect. Therefore, these characters may also be consider on selection of genotypes for pod yield. Yohanna et al. (2014) also reported similar result with significant direct effect of kernel yield and indirect effect of shelling percentage and 100 kernel weight.

Conclusion

Thus it may be concluded that high yield was observed for the genotypes JSSP-50, BG-4, JSP 49 and PBS 22067 alongwith some yield contributing characters. High heritability alonwith high to moderate genetic advance was observed for the characters pod yield, kernel yield and 100 kernel weight, days to maturity and oils percentage. Hence these characters may be effective for selection of high pod yield genotypes. Highly significant correlation was observed for the character kernel yield.

Reference

1. John K. Vasanthi RP, Venkateswarlu O. Variability and correlation studies for pod yield and its attributes in F2 generation of six Virginia X Spanish crosses of groundnut (*Arachis hypogaea* L.) Legume Res. 2007; 30(4):292-296.
2. Savaliya JJ, Pansuriya AG, Sodavadiya PR, Leva RL Evaluation of inter and intraspecific hybrid derivatives of groundnut (*Arachis hypogaea* L.) for yield and its componants. *Legume Res*, 2009; 32(2):129-132.
3. Zaman MA, Khatun MT, Ullah MZ, Moniruzzamn M, Alam KH. Genetic variability and path analysis of groundnut (*Arachis hypogaea* L.) A Scientific Journal of Krishi Foundation, 2011; 9(1, 2):29-36.
4. Narasimula N, Kenchanagoudar, Gowda MVC. Study of genetic variability and correlation in selected groundnut genotypes IJABPT, 2012; 3(1):355-357.
5. Pavan Kumar C, Rekha R, Venkataeswarula, vasanthi RP. Correlation and Path coefficient analysis in groundnut (*Arachis hypogaea* L.) *IJABPT*, 2014; 5(1):9-11.
6. Yohanna Mamma KWAGA. Direct and indirect contribution of yield attributes to the kernel yield of groundnut (*Arachis hypogaea* L.) *IJABPT*, 2014; 2(2):9-11.