Original Research Article

GENETIC VARIABILITY AND CHARACTER ASSOCIATION STUDIES IN FOXTAIL MILLET (*Setaria italica* L.) FOR GRAIN YIELD CHARACTERS

ABSTRACT

In this experiment, 20 different genotypes of foxtail millet were examined using correlation and path analysis in the rainy season of 2021, at the crop research farm (CRF, SHUATS) in Allahabad, the entire experiment was set up using a completely randomized block design (RBD) with three replications. All the genotypes have shown considerable variation in their mean performance with respect to all the studied traits. According to the ANOVA table, have demonstrated significant differences for all 12 examined variables. The observed variation is probably due to both favourable environmental factors and genotypes because PCV is just little greater than GCV. A significant positive correlation between the examined attributes and grain yield was found. A strong positive association and a positive direct effect at the phenotypic level, research using path analysis demonstrated that the traits of panicle length, number of tillers per plant, test weight, and flag leaf length had a real relationship with grain yield per plant. It can be concluded that panicle length, number of tillers per plant, test weight, and flag leaf length could serve as important traits in any selection programme for developing high-yielding foxtail millet genotypes based on the nature and magnitude of character associations and their direct and indirect effects.

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Keywords: Foxtail millet, Genetic variability, Correlation and Path analysis.

INTRODUCTION

One of the earliest crops used for food grain, hay, and pasture is foxtail millet (*Setaria italica* (L.) Beauv). It has been farmed in China from around the sixth millennium BC, giving it the longest history of cultivation among the millets. Small millets are one of the ancient cereals that farmers still plant today, mostly in regions of the world that are prone to drought. Even in the harshest climes, they may thrive in dry and semi-arid regions' weak soils, where no other crop can grow and provide great yields

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(Howarth et al., 2002). However, because to the effects of the green revolution, their cultivation is neglected and further relegated to "Orphan cereals" (Brunda et al., 2015). Foxtail millet ranks second in terms of global production after finger millet among tiny millets, although this has changed recently due to high demand from health-conscious customers and its adaptability to climate-resilient cultivation. In India, foxtail millet is cultivated on 98,489 ha of land, yielding an estimated 56,327 tons of grain per hectare on average (Anonymous, 2017). It has good nutritional value; 100grams of foxtail millet grains have 9.9 grams of protein, 72 grams of carbohydrates, 2.5 grams of fat, 3.5 grams of ash, 10 grams of crude fibre, 0.27 milligrams of potassium, 0.01 milligrams of thiamine, 0.099 milligrams of riboflavin, 0.82 milligrams of pantothenic acid, 3.70 milligrams of niacin, and 0.02 milligrams.

It has been revealed that millets, which are considered "smart foods," can enhance growth in children and adolescents by 26 to 39 percent where they replace rice in typical meals. Malnutrition is one of the key issues that is most common in underdeveloped countries worldwide. The findings imply that millets can greatly contribute to conquering hunger and that there is definitely a need for the genetic development of the rice crop because rice is one of the main food sources in all developing and impoverished countries. Being a complex character, a crop's grain yield is affected by many of its dependent traits and is regulated by polygenes as well as environmental factors. Planning a successful selection method for evolving high-yielding genotypes requires knowledge of the heredity of yield and its related qualities, heritability, estimated genetic advance, and associations between important economic factors. The presence of variability is necessary for these qualities to improve. The fundamental requirement for any crop development is variability for traits of economic significance. Breeding high-yielding varieties, either through heterosis breeding or pure line selection, is crucial for increasing grain yields. The probability of selecting a desired genotype will increase with the presence of a wider spectrum of diversity. In addition to genetic variability, understanding heritability and genetic advance evaluate the proportion of a character that is passed down to offspring, assisting the breeder in using an appropriate breeding strategy to attain the goal.

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Materials and Methods

The experiment was conducted on the Crop research fields at the field experiment centre of the Department of Genetics and Plant breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, technology and sciences, Prayagraj, U.P. at 25.57° North Latitude, 81.56" North, and 98 metres above sea level. The region receives roughly 1013.4 mm of rain on average per year, with the majority falling from July to September. The 20 foxtail millet genotypes which include

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Comment [A9]: Provide germplasm details pedigree source etc a CHECK variety were laid out in a Randomized Block Design replicated thrice. Each genotype was sown in three rows of three meters length with a spacing of 30cm between the rows and 10cm between the plants. Data was recorded on various morphological characters such as Days to 50% flowering, Days to maturity, plant height, flag leaf length, flag leaf width, flag leaf area, panicle length, peduncle length, number of tillers, number of productive tillers, test weight, grain yield per plant. These observations were recorded on randomly selected five competitive plants per plot in each replication except for days to 50 percent flowering and days to maturity where observations were recorded on whole plot basis. In the present investigation, the foxtail millet genotypes were examined to characterize the germplasm for yield and yield contributing characters, to estimate the genetic variability among the yield and its contributing characters, and also examined the correlation and path analysis for grain yield and its contributing characters. The estimation of mean, variance and standard error were worked out by adopting the standard methods **Panse and Sukhatme, (1964)**. Phenotypic variance and genotypic variance estimated according to the procedure given by (Burton 1952). Heritability (h^2) in the broad sense was calculated according to **Burton and Devane, (1953)**. Genetic advance was expressed as percentage of mean by using the formula suggested by Johnson et al. (1955). The genotypic correlation between yield and its component traits and among themselves was worked out as per the methods suggested by **Al Jibouri *et al.*, (1958)**. The correlation coefficient was partitioned into direct and indirect causes according to **Dewey and Lu (1959)**.

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Results and Discussion

Studies on variability among the germplasm

The genetic variability studies provide the information about the genetic properties of the population. Based on the result of the genetic variability the breeding methods are formulated for further crop breeding. This study helps to know about the nature and extent of variability in the population, the effect of the environment on the characters, heritability, and the genetic advance. The heritability is generally effected by the environment so, the selection process based on heritability alone is not appropriate. The heritability in addition with the genetic advance will be more reliable.

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In the present investigation 12 quantitative characters were observed for variability and character association among themselves. The results of quantitative characters are summarized in Table 1. The estimates of genotypic coefficient of variation, phenotypic coefficient of variation, heritability, genetic advance as percent of mean are given in Table 2. Days to 50 percent flowering ranged from 41 to 63 days with CV of 8.51 percent. Days to maturity ranged 64 to 86 with CV of 8.18. Plant height varied from 75.85 to 152.37 with CV of 7.81. Flag leaf length varied from 23.53 to 67.79 with CV of 8.83. Flag leaf width varied from 1.31 to 2.61 with CV of 6.95. Flag leaf area ranged from 55.90 to 124.07 with a CV of 6.66. Number of tillers varied from 0.70 to 2.35 with CV of 7.11. Number of productive tillers varied from 0.75 to 2.21 with CV of 7.95. Peduncle length ranged from 5.56 to 14.37 with CV of 6.59. Panicle length ranged from 11.48 to 22.88 with CV of 7.67. Test weight ranged from 0.54 to 2.39 with CV of 7.90. Grain yield per plant varied from 2.41 to 6.07 with CV 6.92 evaluated.

In the present study, all the traits showed a narrow difference between the phenotypic coefficient of variance (PCV) and genotypic coefficient of variance (GCV) except days to 50 percent, indicating the effect of environment on the expression of the traits. The highest GCV and PCV values were recorded in test weight (37.52 percent and 38.35 percent), followed by flag leaf length (29.83 percent and 31.11 percent), and no. of productive tillers (27.65 percent and 28.78 percent), respectively. The lowest GCV and PCV values were seen in days to maturity (5.59 percent and 9.91 percent), followed by days to 50% flowering (9.62 percent and 12.84 percent). Heritability estimates for all the features ranged from 31.83 to 95.76 percent. The Test weight (95.75), No. of tillers (93.89) and Grain yield per plant (92.75) had the highest heritability, whereas the Days to 50% flowering (56.09) and days to maturity (31.83) had the lowest heritability. The highest GA was found in the Plant height (31.57) and Flag leaf area (28.23), while the lowest GA was discovered in the width of the flag leaf (0.59%) and the number of productive tillers (0.85 percent). High estimates of heritability in broad sense in conjugation with high genetic advance as percent of mean were observed for test weight, flag leaf length, number of tillers, number of productive tillers, grain yield per plant, plant height, flag leaf width, flag leaf area, panicle length, and peduncle length.

Studies on the Association of the characters

Several yield-contributing characteristics have an impact on grain yield, a complex trait. Therefore, adopting effective selection strategies involves knowing familiar with the extent of the genetic variability of yield-contributing traits and their connection with yield. The development of new varieties is made efficient and effective through the use of yield-attributing characters in indirect selection, which may yield better results than direct selection for yield alone. Correlation studies provide a measure of association between characters and assist in the identification of the key yield-attributing characters. In general, the correlation between yield and other characters as well as among the component characters will vary with the genotype handled by the breeder. In the present investigation, genotypic and phenotypic correlations between the traits have been studied to identify the traits that are closely related to the grain yield. In the phenotypic correlation, the characters such as plant height (0.319), flag leaf area (0.720), peduncle length (0.317), and panicle length (0.616) have shown a high significant positive correlation with the grain yield. Most of the characters had positive inter correlations with each other. In the genotypic correlation, characters such as days to 50% flowering (0.344), days to maturity (0.451), plant height (0.403), Flag leaf area (0.775), peduncle length (0.351), panicle length (0.672) have shown a high significant positive correlation with the grain yield.

The path analysis takes into account the cause-and-effect relationship between the variables by partitioning the association into direct and indirect effects through other independent variables. In the present investigation, both genotypic and phenotypic path coefficient analysis have been studied to identify the direct and indirect effects of all the traits on grain yield in both genotypic and phenotypic levels. The results of the genotypic path analysis revealed that the highest positive direct effect on the grain yield was shown by panicle length (0.9585), followed by test weight (0.818), number of tillers (0.6654), and days to maturity (0.6258). The characters such as days to 50% flowering, flag leaf length, flag leaf width, and peduncle length have also shown a positive direct effect on grain yield per plant. Negative direct effects were shown by plant height (-0.7196), flag leaf area (-0.1541), and number of productive tillers (-0.6533). The phenotypic path analysis reveals that all the studied traits have shown positive direct effects on the grain yield per plant except for plant height (-0.2196) and number of productive tillers (-0.0999) which showed negative direct effects. The highest positive direct effect was shown by panicle length (0.444) and the lowest direct effect was shown by number of productive tillers (-0.0999).

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Conclusion

From the investigation, it is concluded that the analysis of variance showed significant variation in all the characters which give the scope for a further breeding program. Among 20 genotypes SiA 3156 (6.07), IIMR FxM-11 (5.64), TNSi 380 (4.64), and SiA 4213 (4.60) were found to be superior in grain yield when compared to the CHECK DHFt 109-3 (3.77). High GCV, PCV, high heritability, and

Genetic advance as percent mean in the present genotypes were recorded for the test weight. Grain yield per plant showed a high positive and significant correlation with flag leaf area and panicle length. The parameters like Panicle length, Test weight, Number of tillers, and Flag leaf length had positive direct effects on the grain yield per plant in the path coefficient analysis. It can therefore be concluded that traits such as flag leaf length, number of tillers, test weight and panicle length are the important yield contributing traits and has to be given due consideration in the selection program for improving grain yield characters.

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Table 1: Mean performances of 20 foxtail millet genotypes for 12 quantitative traits

S.No.	Genotypes	DF 50%	DM	PH (cm)	FLL (cm)	FLW (cm)	FLA	NTT	NPT	PeL (cm)	PL (cm)	Tw (g)	GYP (g)
1	GPUF 16	53	80	124.46	67.79	1.63	80.75	1.49	1.36	10.84	17.79	1.14	4.09
2	IIMR FxM-9	48	72	152.37	32.82	1.42	78.81	1.23	1.09	10.81	15.72	2.38	2.41
3	SiA 4201	41	64	75.85	23.53	1.80	73.33	0.7	0.75	13.15	13.88	1.14	2.46
4	CRS FxM 3	52	81	91.14	30.52	1.30	74.29	2.27	1.97	6.90	16.38	0.77	3.03
5	BUFTM 82	63	81	128.77	29.59	1.59	75.38	2.17	2.16	11.43	16.25	1.60	3.97
6	CRS FXM 4	53	86	118.84	28.67	1.41	74.70	2.34	2.21	8.93	16.16	0.82	3.27
7	DHFt 20-3	53	67	141.98	34.80	1.74	87.89	1.95	1.80	11.83	19.24	1.35	3.45
8	IIMR FxM-8	54	71	101.28	25.69	2.27	55.90	2.12	2.11	5.56	11.48	1.17	2.48
9	IIMR FxM-11	50	83	133.99	30.15	2.11	98.77	1.46	1.01	12.57	18.76	1.60	5.64
10	BUFTM 98	49	76	129.01	37.37	1.56	86.97	1.76	1.27	12.77	16.38	2.15	4.48
11	TNSi 380	52	82	144.31	31.89	1.53	83.63	1.09	1.09	8.53	19.48	1.84	4.64

Df50 %- Days to 50% Flowering, DM- Days to Maturity, PH- Plant Height, FLL-Flag Leaf Length, FLW- Flag Leaf Width, FLA- Flag Leaf Area, PeL- Peduncle Length, PL-Panicle Length, NTT- Number of Total Tillers, NPT- No. of Productive Tillers, TW- Test Weight, GYP- Grain Yield Per Plant.

Table 1(continued)

S.No.	Genotypes	DF 50%	DM	PH(cm)	FLL (cm)	FLW (cm)	FLA	NTT	NPT	PeL (cm)	PL (cm)	Tw (g)	GYP (g)
12	DHFt-20-153	56	80	120.17	25.96	1.59	68.98	1.13	1.28	8.71	20.53	0.53	3.10
13	TNPSi 382	56	77	104.53	54.63	1.54	56.71	1.11	1.42	9.46	13.82	1.62	3.45
14	**SiA 3156**	63	75	123.83	38.95	1.88	124.07	2.01	1.80	10.43	22.87	1.01	**6.07**
15	TNSi 385	62	83	121.11	32.58	2.60	96.39	1.48	1.46	9.42	16.28	1.37	3.99
16	IIMR FxM-7	46	76	126.72	27.38	1.49	86.30	1.80	1.56	12.25	17.16	1.39	3.91
17	SiA 4213	49	75	121.51	36.10	1.62	79.75	1.96	1.80	14.37	19.27	1.24	4.60
18	IIMR FxM-6	52	78	113.35	30.07	1.52	71.62	2.23	2.15	9.54	15.47	2.08	3.89
19	IIMR FxM-10	52	76	128.48	28.59	1.71	83.00	1.49	1.37	8.71	14.65	2.38	4.11
20	DHFt 109-3(CHECK)	63	83	140.18	35.04	1.66	90.18	1.42	1.22	11.31	15.51	0.79	**3.77**
	Mean	53	77	122.10	34.11	1.70	81.36	1.66	1.55	10.38	16.86	1.42	3.84
Range	**Minimum**	41	64	75.85	23.53	1.31	55.90	0.70	0.75	5.56	11.48	0.54	2.41
	Maximum	63	86	152.37	67.79	2.61	124.07	2.35	2.21	14.37	22.88	2.39	6.07
	CV	8.51	8.18	7.81	8.83	6.95	6.66	7.11	7.95	6.59	7.67	7.90	6.92
	Sem	2.63	3.66	5.50	1.74	0.07	3.13	0.07	0.07	0.39	0.75	0.06	0.15
	CD	7.54	10.48	15.75	4.98	0.20	8.96	0.20	0.20	1.13	2.14	0.19	0.44

Df50 %- Days to 50% Flowering, DM- Days to Maturity, PH- Plant Height, FLL-Flag Leaf Length, FLW- Flag Leaf Width, FLA- Flag Leaf Area, PeL- Peduncle Length, PL-Panicle Length, NTT- Number of Total Tillers, NPT- No. of Productive Tillers, TW- Test Weight, GYP- Grain Yield Per Plant.

Table 2: Genetic parameters for 12 quantitative characters in 20 Foxtail genotypes evaluated during *kharif*-2021

S.No.	Traits	GCV	PCV	h^2 (Broad Sense)	GA	GAM
1	Days to fifty percent flowering	9.62	12.84	56.09	7.96	14.84
2	Days to maturity	5.59	9.91	31.83	5.04	6.50
3	Plant height	14.30	16.29	77.05	31.57	25.86
4	Flag leaf length	29.83	31.11	91.94	20.09	58.91
5	Flag leaf width	17.91	19.21	86.92	0.59	34.39
6	Flag leaf Area	17.96	19.16	87.90	28.23	34.69
7	Number of tillers	27.90	28.79	93.89	0.93	55.69
8	Number of productive tillers	27.65	28.78	92.36	0.85	54.75
9	Peduncle length	20.74	21.77	90.83	4.23	40.73
10	Panicle length	14.95	16.80	79.18	4.62	27.40
11	Test weight	37.52	38.35	95.76	1.08	75.64
12	Grain yield per plant	24.74	25.69	92.75	1.89	49.08

GCV = Genotypic Coefficient of Variation, PCV = Phenotypic Coefficient of Variation,

$\mathbf{h^2}$ = Heritability, GA = Genetic Advance, GAM = Genetic Advance as Mean %

Table 3: Phenotypic correlation of 20 foxtail genotypes for 12-grain yield traits

Characters	DM	PH	FLL	FLW	FLA	NTT	NPT	PeL	PL	TW	GYP
Df50%	0.393*	0.264*	0.1449	0.2171	0.2103	0.2370	0.278*	-0.267*	0.1240	-0.2166	0.2252
DM	1.0000	0.2247	0.1030	-0.0509	0.1040	0.0944	0.0830	-0.2033	0.1576	-0.1310	0.2397
PH		1.0000	0.0888	-0.0819	0.379*	-0.0057	-0.1600	0.1780	0.351*	0.355*	0.319*
FLL			1.0000	-0.0950	0.0423	-0.1145	-0.0968	0.1029	0.1026	0.0015	0.2070
FLW				1.0000	0.2423	-0.1086	-0.0798	-0.0768	-0.0982	-0.0547	0.1514
FLA					1.0000	0.0476	-0.1804	0.334*	0.592**	-0.0142	0.720**
NTT						1.0000	0.878**	-0.1982	0.0443	-0.1380	0.1318
NPT							1.0000	-0.320*	-0.0678	-0.1922	-0.0424
PeL								1.0000	0.264*	0.1275	0.317*
PL									1.0000	-0.2330	0.616**
TW										1.0000	0.1106

*, ** indicates significance at 5% and 1% at the level of significance, respectively

Df50 %- Days To 50% Flowering, DM- Days to Maturity, PH- Plant Height, FLL-Flag Leaf Length, FLW- Flag Leaf Width, FLA- Flag Leaf Area, PeL- Peduncle length, PL-Panicle Length, NTT- Number of Total Tillers, NPT- No. of Productive Tillers, TW- Test Weight, GYP- Grain Yield Per Plant.

Table 4: Genotypical correlation coefficient of 20 foxtail millet genotypes for yield and its related traits

Characters	DM	PH	FLL	FLW	FLA	NTT	NPT	PeL	PL	TW	GYP
Df50%	0.634**	0.2296	0.2083	0.369*	0.332*	0.279*	0.421**	-0.328*	0.2518	-0.313*	0.344*
DM	1.0000	0.337*	0.1323	-0.0838	0.1644	0.302*	0.2394	-0.311*	0.2496	-0.260*	0.451**
PH		1.0000	0.1221	-0.0820	0.464**	-0.0302	-0.1468	0.264*	0.469**	0.400*	0.403*
FLL			1.0000	-0.1221	0.0298	-0.1287	-0.0929	0.1284	0.1297	0.0058	0.2341
FLW				1.0000	0.287*	-0.0983	-0.1010	-0.0939	-0.0975	-0.0767	0.1971
FLA					1.0000	0.0612	-0.1713	0.394*	0.717**	-0.0037	0.775**
NTT						1.0000	0.940**	-0.1980	0.0428	-0.1263	0.1409
NPT							1.0000	-0.380*	-0.0488	-0.2025	-0.0373
PeL								1.0000	0.319*	0.1416	0.351*
PL									1.0000	-0.2529	0.672**
TW										1.0000	0.1239

*, ** indicates significance at 5% and 1% at the level of significance, respectively

Df50 %- Days To 50% Flowering, DM- Days to Maturity, PH- Plant Height, FLL-Flag Leaf Length, FLW- Flag Leaf Width, FLA- Flag Leaf Area, PeL- Peduncle Length, PL-Panicle Length, NTT- Number of Total Tillers, NPT- No. of Productive Tillers, TW- Test Weight, GYP- Grain Yield Per Plant.

Table 5: Genotypical path coefficient analysis of 20 foxtail millet genotypes for yield and its related traits

Characters	Df50%	DM	PH (cm)	FLL (cm)	FLW (cm)	FLA	NTT	NPT	PeL (cm)	PL (cm)	TW (g)	GYP
Df50%	0.239	0.1515	0.0549	0.0498	0.0882	0.0793	0.0668	0.1006	-0.0784	0.0602	-0.0748	0.344*
DM	0.3967	0.6258	0.2107	0.0828	-0.0524	0.1029	0.1887	0.1498	-0.1947	0.1562	-0.163	0.451**
PH (cm)	-0.1652	-0.2423	-0.7196	-0.0878	0.059	-0.3338	0.0217	0.1057	-0.1899	-0.3372	-0.2874	0.403*
FLL (cm)	0.0179	0.0114	0.0105	0.0861	-0.0105	0.0026	-0.0111	-0.008	0.0111	0.0112	0.0005	0.2341
FLW (cm)	0.1279	-0.029	-0.0284	-0.0423	0.3465	0.0995	-0.0341	-0.035	-0.0325	-0.0338	-0.0266	0.1971
FLA	-0.0512	-0.0253	-0.0715	-0.0046	-0.0443	-0.1541	-0.0094	0.0264	-0.0608	-0.1105	0.0006	0.775**
NTT	0.1858	0.2006	-0.0201	-0.0856	-0.0654	0.0407	0.6654	0.6251	-0.1317	0.0285	-0.084	0.1409
NPT	-0.2748	-0.1564	0.0959	0.0607	0.066	0.1119	-0.6138	-0.6533	0.2481	0.0319	0.1323	-0.0373
PeL (cm)	-0.1175	-0.1115	0.0946	0.046	-0.0337	0.1413	-0.071	-0.1362	0.3585	0.1143	0.0508	0.351*
PL (cm)	0.2414	0.2393	0.4492	0.1243	-0.0935	0.6872	0.041	-0.0468	0.3056	0.9585	-0.2424	0.672**
TW (g)	-0.256	-0.213	0.3268	0.0048	-0.0628	-0.003	-0.1033	-0.1657	0.1158	-0.2069	0.818	0.1239
GYP	0.344*	0.451**	0.403*	0.2341	0.1971	0.775**	0.1409	-0.0373	0.351*	0.672**	0.1239	1.0000

*, ** indicates significance at 5% and 1% at the level of significance, respectively

Df50 %- Days To 50% Flowering, DM- Days to Maturity, PH- Plant Height, FLL-Flag Leaf Length, FLW- Flag Leaf Width, FLA- Flag Leaf Area, PeL- Peduncle Length, PL-Panicle Length, NTT- Number of Total Tillers, NPT- No. of Productive Tillers, TW- Test Weight, GYP- Grain Yield Per Plant.

Table 6: Phenotypical path coefficient analysis of 20 foxtail millet genotypes for yield and its related traits

Characters	DF50%	DM	PH	FLL	FLW	FLA	NT	NPT	PeL	PL	TW	GYPP
Df50%	0.11	0.04	0.03	0.02	0.02	0.02	0.03	0.03	-0.03	0.01	-0.02	0.23
DM	0.07	0.19	0.04	0.02	-0.01	0.02	0.02	0.02	-0.04	0.03	-0.02	0.24
PH	-0.06	-0.05	-0.22	-0.02	0.02	-0.08	0.00	0.04	-0.04	-0.08	-0.08	0.319*
FLL	0.02	0.02	0.01	0.15	-0.01	0.01	-0.02	-0.01	0.02	0.01	0.00	0.21
FLW	0.03	-0.01	-0.01	-0.01	0.13	0.03	-0.01	-0.01	-0.01	-0.01	-0.01	0.15
FLA	0.08	0.04	0.15	0.02	0.09	0.39	0.02	-0.07	0.13	0.23	-0.01	0.720**
NTT	0.06	0.02	0.00	-0.03	-0.03	0.01	0.24	0.21	-0.05	0.01	-0.03	0.13
NPT	-0.03	-0.01	0.02	0.01	0.01	0.02	-0.09	-0.10	0.03	0.01	0.02	-0.04
PeL	-0.04	-0.03	0.03	0.01	-0.01	0.05	-0.03	-0.05	0.14	0.04	0.02	0.317*
PL	0.06	0.07	0.16	0.05	-0.04	0.26	0.02	-0.03	0.12	0.44	-0.10	0.616**
TW	-0.08	-0.05	0.12	0.00	-0.02	0.00	-0.05	-0.07	0.04	-0.08	0.35	0.11

*, ** indicates significance at 5% and 1% at the level of significance, respectively

Df50 %- Days To 50% Flowering, DM- Days to Maturity, PH- Plant Height, FLL-Flag Leaf Length, FLW- Flag Leaf Width, FLA- Flag Leaf Area, PeL- Peduncle Length, PL-Panicle Length, NTT- Number of Total Tillers, NPT- No. of Productive Tillers, TW- Test Weight, GYP- Grain Yield Per Plant.