Research Article

Ekin
Journal of Crop Breeding and Genetics

4(2):45-51, 2018

www.ekinjournal.com

Ekin International biannual peer-reviewed journal

Genetic Variability and Character Association in Advance Inbred Lines of Pearl Millet Under Optimal and Drought Condition

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Citation:
Singh J., Chhabra A. K., 2018. Genetic Variability and Character Association in Advance Inbred Lines of Pearl Millet Under Optimal and Drought Condition. Ekin J. 4(2):45-51, 2018.

Received: 10.05.2018 ***Accepted: 24.06.2018*** ***Published Online: 30.07.2018*** ***Printed: 30.07.2018***

ABSTRACT

This study was conducted to investigate genetic variability among 50 advance inbred lines of pearl millet. The genotypes were evaluated for 15 growth traits, yield components, and grain yield. All the quantitative traits varied significantly among the tested genotypes. A wide range was observed for all parameters of genetic variability for all the traits. A higher PCV for various characters than its corresponding GCV suggested the role of considerable component of environment in the expression of all these characters. High to moderate heritability and genetic advance as per cent of mean for dry fodder yield per plant, grain yield per plant indicated that selection will be effective for further improvements. Comparative mean performance for various traits of Bawal location (drought) and Hisar location (normal) revealed that the characters expression at Bawal was much reduced causing significant reduction in grain yield. The correlation coefficients revealed that estimated genotypic correlations for most of the characters were greater than their corresponding phenotypic ones. Results revealed that number of tillers per plant at Hisar location and dry fodder yield at Bawal location can be used as indirect selection criteria to increase the seed yield.

Keywords**:** drought response index, heritability, genetic advance, morpho-physiological traits

Introduction

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the staple food grain with a high nutritional value and is also used as a feed, fodder, construction material and even its potential as a source of bio-fuel. As compared to the early 1980s, pearl millet area in India declined by 26% during 2014-15, but production increased by 19% owing to 48% increase in productivity. It is cultivated in the most sandy, infertile soils and drought prone environments where no other cereal crop can survive even under these conditions, pearl millet yields 500-800 kg/ha of grain. Pearl millet hybrids maturing in 80-85 days, when cultivated as an irrigated summer season crop in parts of Rajasthan, Uttar Pradesh, Gujarat and Maharashtra states of India, have been reported to give as high as 5000-7000 kg/ha of grain yield (Anonymous 2016).

Pearl millet is principally a cross pollinated crop where heterozygocity *perse* has to be maintain to realize elite hybrids or improved population. That in termed can be achieved through incorporating diverse inbred lines in crossing programme (three lines system) for hybrids and/or development of open pollinated improved population. This necessitates evaluation of good number of inbred lines under different growth environment so that promising inbred line could be selected for further improvement. Moreover information on genetic variability parameters like GCV, PCV, heritability and genetic advance in given set of population and correlation co-efficient will among various traits could help deciding the selection intensity and direction of selection for further improvement. Keeping these aspects in view the presence study was conducted to evaluate a set of 50 genotypes of pearl millet under two growth environments representing rainfed drought condition at Bawal and normally irrigated condition at Hisar location.

Material and Methods

The present investigation was conducted at the Research Area of Pearl millet Section at Hisar and Regional Research Station (RRS) at Bawal, CCS Haryana Agricultural University, Hisar representing typical semi-arid conditions during Kharif 2013.The material comprised 50 pearl millet inbred lines. The experiment was conducted in RBD with 3 replications. Three irrigations were applied at Hisar location whereas rainfed crop was grown at Bawal with plot size of two row of 4.0 meter length. Plant to plant distance within a row (10 cm) and row to row distance (50 cm) were maintained at both the locations. Analysis of Variance was computed for all the traits as described by Gomez and Gomez (1984). Correlation coefficients among characters were determined by using the variance and covariance components as suggested by Al-joubri *et al*., (1958). Estimates of appropriate components were substituted for the parameters to predict expected genetic gain as suggested by Johnson *et al*., (1955).

Results and Discussion

Drought stress is one of the major constraints for the crop productivity, which is affecting 1/3rd of arable land world-wide and will probably increase in the on-going climate changes. Therefore, for sustaining the productivity in future drought tolerance is important.

In both the locations ANOVA revealed (data not given for brevity) highly significant genotypic differences among the genotypes for leaf rolling, flag leaf area (cm^2), flag leaf angle, number of tillers per plant , stem thickness (mm), plant height (cm), grain yield (g), dry fodder yield (g), days to 50% flowering , panicle length (mm), grain yield per panicle (g) , grain volume, total panicle number per plant, grain mass (1000 grain wt.) and grain number per panicle were significant in both the environments. Over all mean of genotypes was less in Bawal as compared to that in Hisar location for all the characters.

Heritability in broad sense, genetic advance in terms of per cent of mean also showed a wide range in both the environments (Table 1). High estimates of coefficient of variation along with high to moderate heritability and genetic advance as per cent over mean for grain per panicle, grain yield per panicle and dry fodder yield are indicative of additive genetic variance for these characters. Grain yield and plant height and tillers per plant had moderate heritability with moderate genetic advance at both locations *viz*., Hisar and Bawal which indicated non-additive genetic variance. High heritability, low genetic advance and low variability were observed for panicle length *i.e.* [heritability 57.56, PCV 6.66, GCV 5.06 (Hisar), heritability 80.37, PCV 6.77, GCV 6.06 (Bawal), respectively] for days to 50% flowering which indicates prevalence of non-additive genetic variance. Selection in later generation might be more effective for such traits. Singh and Singh (2016) estimated high heritability for plant height and panicle length. All characters i.e. number of tillers per plant, plant height, panicle length, panicle diameter, number of leaves per plant, test weight, days to 50% flowering, and grain yield showed high heritability with high genetic advance that indicated the predominance of additive type of gene action for these characters.

Correlation co-efficient

Grain yield per plant expressed a positive and significant correlation with flag leaf area (0.1708*), number of tillers per plant (0.1760*), plant height (0.4226**), dry fodder yield (0.3834**), panicle length (0.2687**), grain yield per panicle (0.8620**), total panicle number per plant (0.1851*), grain number per panicle (0.6458**) while it expressed a negative correlation with days to 50% flowering (-0.2026*) at Hisar location (Table 2.2). Grain yield per plant expressed a positive correlation with flag leaf area (0.2080*), flag leaf angle (0.1712*), number of tillers per plant (0.1667*), plant height (0.5983**), dry fodder yield (0.1932*), panicle length (0.3352**), grain yield per panicle (0.7920**), total panicle number per plant (0.2472**), grain mass (0.2890**), grain number per panicle (0.4557**), while it expressed a negative correlation with days to 50% flowering (-0.3092**), at Bawal location (Table 2.1).

Number of tillers per plant (0.176*, 0.166*), dry fodder yield (0.383**, 0.193*) grain yield per panicle (0.862**, 0.792**) and grain number per panicle (0.645**, 0.457**) had positive significant correlation with grain yield at Hisar and Bawal locations respectively which indicated major yield attributing traits were played significant role. Kumar *et al*., (2014) evaluated a set of 26 pearl millet hybrids at Regional Research Station, Bawal, CCSHAU under rainfed conditions to estimate the genetic parameters, correlation and path coefficient analysis for yield and its component traits.

Significant differences were observed among the hybrids for all the characters studied. Genetic variability and character association among the twenty advanced hybrids, twelve R line and twelve B lines of pearl millet was studied by Dapke *et al*., (2014) for ten quantitative traits. Considerable amount of variation was observed for all the genotypes in their mean performances with respect to the characters studied that indicated presence of sufficient variability and scope for further selection and breeding superior and desirable genotypes. Ezeaku *et al*., (2015) studied 24 parental lines of pearl millet A/B pairs along with seed parent across five locations for eight characters to determine yield and yield component relationships, heritability estimates as well as genetic advance. Correlation coefficient analysis showed that stand count, plant height and head weight are significantly and positively correlated with grain yield while days to 50% flowering was significant but negatively correlated with grain yield.

Conclusion

The present study conclusively revealed that the performance of various inbred lines for various traits including grain yield and dry fodder yield were significantly different over locations as well as within a location. Different traits revealed different magnitude of mean range, GCV, PCV, co-efficient of variation, heritability and genetic advance. This indicated adequate genetic variation in the present material for various traits. The selection gains each trait will be determined by heritability and genetic advance and the selection intensity applied during selection phase. Accordingly traits with high variability and high genetic advance are more amenable for selection where as traits with high heritability and moderate to low genetic advance would need high selection intensity for tangible selection gain. The correlation co-efficient revealed that traits *viz*., stem thickness, plant height, panicle length, grain yield per panicle and panicles per plant were positively associated with grain yield and dry fodder yield. Hence selection for these yield components would result into grain yield improvement. The yield component at Bawal and Hisar location partially varied and these traits should be considered while basing selection at optimal (irrigated) and drought prone (rainfed) location.

Acknowledgements

The authors wish to acknowledge CCSHAU, Hisar pearl millet section and Regional Research Station (RRS), Bawal, for their support for conducting this experiment.

Table 1. Mean, range, co-efficient of variation (phenotypic and genotypic), heritability (broad sense), and genetic advance (as % of mean) for various characters at Hisar and Bawal locations.

No.	Characters		Mean ± SE	Range	Co-efficient of variations (%)		Heritability (broad sense)	Genetic advance as % of mean
					PCV	GCV		
1	Leaf Rolling	HR	2.71±2.33	1.00-4.5	29.23	25.06	73.54	1.20
		BL	4.38±0.32	2.16-6.50	31.39	28.60	83.05	2.35
2	Leaf Area (cm^2)	HR	65.13±4.34	22.24-149.32	41.92	40.26	92.24	51.86
		BL	83.64±8.48	34.48-148.24	35.03	30.21	74.33	44.88
3	Flag Leaf Angle	HR	41.20±2.18	14.66-76.00	35.00	33.75	93.0	27.63
		BL	30.81±1.80	13.233-57.31	29.29	27.44	87.78	16.32
4	Tillers/ Plant	HR	3.60±0.33	1.83-6.33	29.34	24.79	69.54	27.63
		BL	2.94±0.18	1.00-5.20	33.17	31.30	89.01	1.78
5	Stem Thickness (mm)	HR	13.46±0.83	10.91-16.89	12.51	6.15	24.2	0.84
		BL	12.69±0.98	9.10-17.34	16.74	9.87	34.76	1.52
6	Plant Height (cm)	HR	154.86±8.70	90.66-212.833	20.99	18.55	78.07	52.29
		BL	136.76±6.86	71.80-208.46	25.89	24.36	88.5	64.56
7	Grain Yield (g)	HR	51.81±3.18	8.03-118.05	58.38	57.38	96.6	60.19
		BL	10.96±0.66	1.57-45.71	69.52	68.70	97.64	15.33
8	Dry Fodder Yield (g)	HR	588.16±10.27	125.00-1676.66	60.36	60.29	99.74	729.56
		BL	93.61±4.62	36.66-430.00	66.61	66.05	98.32	126.31
9	Days to 50% Flowering	HR	53.51±1.32	46.33-59.33	6.66	5.06	57.56	4.23
		BL	47.95±0.82	41.33-55.66	6.77	6.06	80.37	5.37
10	Panicle Length (mm)	HR	190.74±8.17	134.30-308.80	20.02	18.56	85.97	67.65
		BL	188.92±8.66	123.66-313.33	21.35	19.78	85.87	71.36
11	Grain Yield Per Panicle (g)	HR	14.78±1.26	1.51-38.10	59.97	58.07	93.79	17.13
		BL	4.23±0.25	1.01-13.37	64.18	63.32	97.35	5.45
12	Grain Volume	HR	9.48±0.87	4.40-16.01	33.33	29.15	76.46	4.98
		BL	8.59±0.73	3.82-15.13	32.83	29.21	79.17	4.60
13	Panicles/ Plant	HR	3.69±0.35	1.93-6.33	30.52	25.34	68.96	1.60
		BL	2.80±.25	1.00-5.2	37.44	34.02	82.56	1.78
14	Grain Mass (1000 Grain Wt.)	HR	6.36±0.60	2.30-10.67	35.38	31.27	78.11	3.62
		BL	5.66±0.51	1.81-10.08	35.10	31.36	79.84	3.26
15	Grains/ Panicle	HR	2659.72±156.50	202.33-8405.66	66.31	65.50	97.59	3545.59
		BL	828.72±87.23	231.00-2776.33	70.97	68.54	93.27	1130.14
16	Drought Response Index (DRI)	HR	1.30±0.016	0.21-3.98	75.68	75.65	99.92	2.02
		BL	1.30±0.017	0.20-3.98	75.69	75.65	99.91	2.02
17	Drought Susceptible Index (DSI)	HR	0.93±.0075	0.20-1.22	28.52	28.49	99.75	0.54
		BL	0.93±0.0096	.20-1.22	28.53	28.48	99.6	0.54
18	Canopy Temperature (°c)	HR	32.68±0.95	31.34-34.34	4.73	1.95	17.11	0.54
		BL	30.91±0.17	29.70-31.70	1.53	1.17	59.24	57.83
19	Relative Water Content (%)	HR	86.07±1.78	76.14-92.82	5.26	3.82	52.75	4.92
		BL	83.51±2.96	67.83-89.68	7.57	4.34	32.91	4.28
20	Osmotic Potential (MPA)	HR	3.66±0.15	1.75-5.00	25.77	24.66	91.57	1.78
		BL	3.55±0.33	1.72-4.82	25.33	16.35	58.35	1.08
21	Chlorophyll Fluorescence	HR	0.69±0.010	0.58-0.76	5.79	5.14	78.98	0.06
		BL	0.67±0.008	0.56-0.74	5.82	5.36	84.98	0.06

Table 2.1. Phenotypic Correlation Co-efficients between different Morho-physiological characters in pearl millet genotypes at Hisar location.

Character	Leaf Rolling	Flag Leaf Area (cm²)	Flag Leaf Angle	Tillers/ Plant	Stem Thickness (mm)	Plant Height (cm)	Dry Fodder Yield (g)	Days to 50% Flowering	Panicle Length (mm)	Grain Yield Per Panicle (g)	Panicles/ Plant	Grain Mass (1000 Grain Wt.)	Grains/ Panicle	Drought Susceptible Index	Canopy Temperature (°c)	Relative Water Content (%)	Osmotic Potential (MPA)	Chlorophyll Fluorescence
Leaf Rolling	**1.000**	0.1429	0.0891	-0.1132	0.1640*	-0.0563	-0.1049	-0.0129	0.0842	0.0112	-0.111	0.0828	0.012	0.0657	-0.1146	0.0585	-0.1556	0.0293
Flag Leaf Area (cm²)	0.1429	**1.000**	0.1221	-0.1473	0.1741*	0.4781**	0.6044**	-0.0064	0.2227**	0.2740**	-0.1834*	-0.0358	0.1947*	0.0035	0.035	-0.0538	-0.1343	-0.3726**
Flag Leaf Angle	0.0891	0.1221	**1.000**	-0.0204	-0.0787	0.2332**	0.0766	-0.1852*	0.1518	-0.0741	0.0083	0.0975	-0.127	0.0189	-0.0415	-0.087	0.0633	-0.0717
Tillers/ Plant	-0.1132	-0.1473	-0.0204	**1.000**	-0.1016	-0.0372	0.0586	-0.0945	-0.1102	-0.2383**	0.9521**	0.017	-0.1840*	0.0378	-0.0204	-0.0747	0.0831	0.0624
Stem Thickness (mm)	0.1640*	0.1741*	-0.0787	-0.1016	**1.000**	0.0764	0.1023	0.139	0.1732*	0.0093	-0.111	-0.0134	0.0121	-0.0024	-0.1416	0.0198	-0.041	-0.0085
Plant Height (cm)	-0.0563	0.4781**	0.2332**	-0.0372	0.0764	**1.000**	0.5257**	-0.0662	0.5302**	0.3892**	-0.0093	-0.1862*	0.3354**	0.1306	-0.0014	-0.1931*	0.013	-0.3022**
Dry Fodder Yield (g)	-0.1049	0.6044**	0.0766	0.0586	0.1023	0.5257**	**1.000**	0.0011	0.1508	0.4036**	0.0308	-0.0234	0.2752**	-0.02	0.0219	-0.0767	-0.1248	-0.2751**
Days to 50% Flowering	-0.0129	-0.0064	-0.1852*	-0.0945	0.139	-0.0662	0.0011	**1.000**	0.0516	-0.1566	-0.1633*	-0.1723*	0.0716	0.1694*	0.2118**	0.0494	0.0269	0.1062
Panicle Length (mm)	0.0842	0.2227**	0.1518	-0.1102	0.1732*	0.5302**	0.1508	0.0516	**1.000**	0.2839**	-0.1019	0.034	0.2418**	0.0166	0.0859	-0.1131	-0.0304	-0.1677*
Grain Yield Per Panicle (g)	0.0112	0.2740**	-0.0741	-0.2383**	0.0093	0.3892**	0.4036**	-0.1566	0.2839**	**1.000**	-0.2641**	0.0475	0.7377**	0.4682**	0.0514	-0.0705	-0.1368	-0.1811*
Panicles/ Plant	-0.111	-0.1834*	0.0083	0.9521**	-0.111	-0.0093	0.0308	-0.1633*	-0.1019	-0.2641**	**1.000**	0.0169	-0.1949	0.0408	-0.0631	-0.1485	0.0205	0.0297
Grain Mass (1000 Grain Wt.)	0.0828	-0.0358	0.0975	0.017	-0.0134	-0.1862*	-0.0234	-0.1723*	0.034	0.0475	0.0169	**1.000**	-0.4580**	-0.1832*	0.0418	0.0508	-0.0443	-0.1356
Grains/ Panicle	0.012	0.1947*	-0.127	-0.1840*	0.0121	0.3354**	0.2752**	0.0716	0.2418**	0.7377**	-0.1949*	-0.4580**	**1.000**	0.5042**	0.0028	-0.0873	-0.1015	-0.0205
Drought Susceptible Index	0.0657	0.0035	0.0189	0.0378	-0.0024	0.1306	-0.02	0.1694*	0.0166	0.4682**	0.0408	-0.1832*	0.5042**	**1.000**	0.1286	-0.2318**	-0.0308	0.0479
Canopy Temperature(°c)	-0.1146	0.035	-0.0415	-0.0204	-0.1416	-0.0014	0.0219	0.2118**	0.0859	0.0514	-0.0631	0.0418	0.0028	0.1286	**1.000**	-0.1630*	0.2312**	-0.2472**
Relative Water Content (%)	0.0585	-0.0538	-0.087	-0.0747	0.0198	-0.1931*	-0.0767	0.0494	-0.1131	-0.0705	-0.1485	0.0508	-0.0873	-0.2318**	-0.1630*	**1.000**	-0.0423	0.091
Osmotic Potential (MPA)	-0.1556	-0.1343	0.0633	0.0831	-0.041	0.013	-0.1248	0.0269	-0.0304	-0.1368	0.0205	-0.0443	-0.1015	-0.0308	0.2312**	-0.0423	**1.000**	0.1749*
Chlorophyll Fluorescence	0.0293	-0.3726	-0.0717	0.0624	-0.0085	-0.3022**	-0.2751**	0.1062	-0.1677*	-0.1811*	0.0297	-0.1356	-0.0205	0.0479	-0.2472**	0.091	0.1749*	**1.000**
Grain Yield (g)	**-0.0586**	**0.1708***	**-0.0144**	**0.1760***	**-0.0476**	**0.4226****	**0.3834****	**-0.2026****	**0.2687****	**0.8620****	**0.1851***	**0.0511**	**0.6458****	**0.5244****	**0.0297**	**-0.1716**	**-0.1292**	**-0.152**

Table 2.2. Phenotypic Correlation Co-efficients between different Morho-physiological characters in pearl millet genotypes at Bawal location.

Character	Leaf Rolling	Flag Leaf Area (cm²)	Flag Leaf Angle	Tillers/ Plant	Stem Thickness (mm)	Plant Height (cm)	Dry Fodder Yield (g)	Days to 50% Flowering	Panicle Length (mm)	Grain Yield Per Panicle (g)	Panicles/ Plant	Grain Mass (1000 Grain Wt.)	Grains/ Panicle	Drought Susceptible Index	Canopy Temperature (°c)	Relative Water Content (%)	Osmotic Potential (MPA)	Chlorophyll Fluorescence
Leaf Rolling	**1.000**	-0.0042	-0.0916	-0.0902	-0.0010	0.1970*	-0.0689	-0.0332	0.0149	0.1630*	-0.0890	0.1817*	0.0101	0.2228**	0.1499	-0.1450	0.3391**	-0.0388
Flag Leaf Area (cm²)	-0.0042	**1.000**	0.2253**	0.1011	-0.0113	0.1939*	0.3444**	0.0024	0.1583	0.1180	0.0721	0.0789	0.0729	0.0928	-0.0013	-0.0765	-0.0612	-0.1227
Flag Leaf Angle	-0.0916	0.2253**	**1.000**	0.0508	0.0891	0.3550**	0.0413	-0.1192	0.1774*	0.1259	0.1526	0.0631	0.0590	-0.1488	-0.0865	-0.0672	0.2273**	-0.2584**
Tillers/ Plant	-0.0902	0.1011	0.0508	**1.000**	-0.1999*	-0.0295	0.2211**	-0.2287**	-0.0308	-0.3237**	0.9159**	-0.0663	-0.2982**	-0.0037	-0.0856	0.1111	0.0218	0.2736**
Stem Thickness (mm)	-0.0010	-0.0113	0.0891	-0.1999*	**1.000**	0.1631*	-0.0616	-0.0439	0.1813*	0.1138	-0.1186	0.0443	0.1254	0.0298	-0.0018	0.0079	0.0058	-0.2567**
Plant Height (cm)	0.1970*	0.1939*	0.3550**	-0.0295	0.1631*	**1.000**	0.2131**	-0.2650**	0.5333**	0.5956**	0.1030	0.1216	0.3908**	-0.1613*	-0.0284	-0.0488	0.2416**	-0.3415**
Dry Fodder Yield (g)	-0.0689	0.3444**	0.0413	0.2211**	-0.0616	0.2131**	**1.000**	-0.2283**	0.2715**	0.0564	0.2046*	-0.0544	0.0463	0.0764	-0.1328	0.0924	-0.0696	-0.0513
Days to 50% Flowering	-0.0332	0.0024	-0.1192	-0.2287**	-0.0439	-0.2650**	-0.2283	**1.000**	-0.1088	-0.1512	-0.3293**	-0.1412	0.0057	-0.0564	0.1808*	0.0122	-0.2101**	-0.0280
Panicle Length (mm)	0.0149	0.1583	0.1774*	-0.0308	0.1813*	0.5333**	0.2715**	-0.1088	**1.000**	0.3944**	-0.0232	0.0144	0.3333**	-0.2178**	-0.0287	0.0336	0.1699*	-0.1532
Grain Yield Per Panicle (g)	0.1630*	0.1180	0.1259	-0.3237**	0.1138	0.5956**	0.0564	-0.1512	0.3944**	**1.000**	-0.2559**	0.2536**	0.7201**	-0.4954**	0.0467	0.0465	0.2033*	-0.2752**
Panicles/ Plant	-0.0890	0.0721	0.1526	0.9159**	-0.1186	0.1030	0.2046*	-0.3293**	-0.0232	-0.2559**	**1.000**	-0.0659	-0.2657**	0.0004	-0.1174	0.0566	0.0424	0.1650*
Grain Mass (1000 Grain Wt.)	0.1817*	0.0789	0.0631	-0.0663	0.0443	0.1216	-0.0544	-0.1412	0.0144	0.2536**	-0.0659	**1.000**	-0.3602**	-0.1579	0.0470	-0.0750	0.0021	-0.2756**
Grains/ Panicle	0.0101	0.0729	0.0590	-0.2982**	0.1254	0.3908**	0.0463	0.0057	0.3333**	0.7201**	-0.2657**	-0.3602**	**1.000**	-0.3281**	-0.0022	0.0757	0.2023*	-0.0796
Drought Susceptible Index	0.2228**	0.0928	-0.1488	-0.0037	0.0298	-0.1613	0.0764	-0.0564	-0.2178**	-0.4954**	0.0004	-0.1579	-0.3281**	**1.000**	-0.0213	-0.0941	-0.0403	0.0539
Canopy Temperature(°c)	0.1499	-0.0013	-0.0865	-0.0856	-0.0018	-0.0284	-0.1328	0.1808*	-0.0287	0.0467	-0.1174	0.0470	-0.0022	-0.0213	**1.000**	-0.2326**	0.1039	0.0318
Relative Water Content (%)	-0.1450	-0.0765	-0.0672	0.1111	0.0079	-0.0488	0.0924	0.0122	0.0336	0.0465	0.0566	-0.0750	0.0757	-0.0941	-0.2326**	**1.000**	-0.1699*	0.0355
Osmotic Potential (MPA)	0.3391**	-0.0612	0.2273**	0.0218	0.0058	0.2416**	-0.0696	-0.2101**	0.1699*	0.2033*	0.0424	0.0021	0.2023*	-0.0403	0.1039	-0.1699*	**1.0000**	0.0323
Chlorophyll Fluorescence	-0.0388	-0.1227	-0.2584**	0.2736**	-0.2567**	-0.3415**	-0.0513	-0.0280	-0.1532	-0.2752**	0.1650*	-0.2756**	-0.0796	0.0539	0.0318	0.0355	0.0323	**1.000**
Grain Yield (g)	**0.1382**	**0.2080***	**0.1712***	**0.1667***	**0.0019**	**0.5983****	**0.1932***	**-0.3092****	**0.3352****	**0.7920****	**0.2472****	**0.2890****	**0.4557****	**-0.3990****	**-0.1032**	**0.0810**	**0.1447**	**-0.2107****

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