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Assessment of various genotypes for grain yield and its attributes of pearl millet (*Pennisetum glaucum* L.)

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Abstract
Present investigation studied 50 genotypes of pearl millet evaluated in randomized block design with two replications in *kharif*-2021 at Bajara research scheme, College of Agriculture, Dhule (MS). Pearl millet holds fourth rank among important cereal crops such as rice, wheat, maize etc. This investigation was carried out to study various genotypes and their interactions on grain yield and its attributes. ANOVA of the data revealed significant differences among the different genotypes for Days to 50 per cent flowering, Days to maturity, Plant height at maturity (cm), Productive Tillers per plant, Panicle girth (cm), Panicle length (cm),1000 seed weight (g), Protein Content (%), Iron content (ppm), Zinc content (ppm),and Grain yield per plant (g).

Keywords: Pearl millet, genotypes, grain yeild

Introduction
The Pearl millet (*Pennisetum glaucum* L.) is multipurpose crop in the most of the region hence it gives live hood security to millions of farmers. Millets are the complimentary crop to the environment which contribute to mitigating climatic change as it helps to reduce the atmospheric carbon pressure CO_2.The pearl millet has potential to increase income and food security of farmers in arid region while it is one of the hardy crops to wide range of ecological conditions and water scarcity. Pearl millet holds fourth rank among important cereal crops such as rice, wheat, maize etc. An evaluation of 50 genotypes, of pearl millet for different traits with randomized block design revealed valuable genotypes of various characters for specific breeding objectives. The present research dissertation were under taken with view to know the genetic variability, correlation coefficient, path analysis, genetic diversity of fifty different genotypes of Pearl millet. Observations were recorded for eleven different characters of Pearl millet.

Materials and Methods
The experimental materials used for present research consist of 50 genotypes of pearl millet [*Pennisetum glacum* L.] were received from Bajara Research Scheme, College of Agriculture, Dhule, and they are listed out in the (Table 1.)
The experiment was carried out under randomized block design with two replications and having 50 genotypes each, at Bajara Research Scheme, College of Agriculture, Dhule during *Kharif* 2021.

Result and Discussion
Analysis of Variance
The analysis of variance was carried out for eight morphological and three biochemical characters (Table 2). The observations were subjected to appropriate statistical analysis to estimate population mean, range, coefficient of variation and variability; for the days to 50 percent flowering, days to maturity, plant height, number of productive tillers per plants, panicle length, panicle girth, 1000 seed weight, yield per plant, protein content, iron content and zinc content. The mean total of squares due to treatments was determined to be significant for all traits, indicating that significant differences across genotypes existed. In the present investigation analysis of variance revealed highly significant difference among the genotypes and indicating considerable variability among the all characters of genotype studied. The differences due to replications, on the other hand, were not significant, indicating that the land used for the experiment was homogeneous.

Previous study of Subbulakshmi *et al.* (2018) [16], Abdulhakeem *et al.* (2019), Mahalingam *et al.* (2020) [17], Mithlesh Kumar *et al.* (2020) [18], Chauhan *et al.* (2020) [19] also has reported variation among the various characters studied.

Table 1: List of Fifty Genotypes of Pearl Millet

Sr. No.	Genotypes	Source	Sr. No.	Genotypes	Source
1	DHLB-10B	Dhule	26	S-21/07	Dhule
2	ICMB-13444	ICRISAT, Hyderabad	27	S-21/08	Dhule
3	ICMB-10889	ICRISAT, Hyderabad	28	S-21/09	Dhule
4	DHLB-8B	Dhule	29	S-21/10	Dhule
5	DHLB-14B	Dhule	30	S-21/11	Dhule
6	DHLB-15B	Dhule	31	S-21/12	Dhule
7	DHLB-16B	Dhule	32	S-21/13	Dhule
8	DHLB-17B	Dhule	33	S-21/14	Dhule
9	DHLB-21B	Dhule	34	S-21/15	Dhule
10	DHLB-23B	Dhule	35	S-21/16	Dhule
11	DHLB-24B	Dhule	36	S-21/17	Dhule
12	DHLB-27B	Dhule	37	S-21/18	Dhule
13	DHLB-28B	Dhule	38	S-21/19	Dhule
14	DHLB-31B	Dhule	39	S-21/20	Dhule
15	DHLB-32B	Dhule	40	ICMB-9544	ICRISAT, Hyderabad
16	DHLB-33B	Dhule	41	PBLN-2021-203	ICRISAT, Hyderabad
17	DHLB-35B	Dhule	42	PBLN-2021-204	ICRISAT, Hyderabad
18	DHLB-36B	Dhule	43	PBLN-2021-205	ICRISAT, Hyderabad
19	DHLB-37B	Dhule	44	PBLN-2021-206	ICRISAT, Hyderabad
20	S-20/01	Dhule	45	PBLN-2021-207	ICRISAT, Hyderabad
21	S-21/02	Dhule	46	PBLN-2021-208	ICRISAT, Hyderabad
22	S-21/03	Dhule	47	PBLN-2021-209	ICRISAT, Hyderabad
23	S-21/04	Dhule	48	PBLN-2021-210	ICRISAT, Hyderabad
24	S-21/05	Dhule	49	PBLN-2021-211	ICRISAT, Hyderabad
25	S-21/06	Dhule	50	PBLN-2021-212	ICRISAT, Hyderabad

Table 2: Analysis of variance for eleven characters in Pearl millet.

Sr. No	Characters	Mean sum of square		
		Replication (1)	Genotype (49)	Error (49)
1	Days to 50 per cent flowering	6.76000	24.044082**	4.045714
2	Days to maturity	0.04000	16.984490**	6.2440822
3	Plant height at maturity (cm)	337.53040	3304.063745**	87.737817
4	Productive Tillers per plant	0.124842	1.083756**	0.067977
5	Panicle girth (cm)	2.142330	25.317984**	0.981663
6	Panicle length (cm)	2.268066	46.277545**	4.160829
7	1000 seed weight (g)	0.165649	7.786690**	0.387131
8	Protein Content (%)	0.046667	6.434104**	0.454067
9	Iron content (ppm)	12.254270	510.247558**	6.046965
10	Zinc content (ppm)	10.312060	81.545329**	3.995428
11	Grain yield per plant (g)	45.522140	1216.434570**	23.396955

*, ** Exhibited significance at 5% and 1% level, respectively

Identification of promising lines for different characters of pearl millet on RBD

An evaluation of 50 genotypes, of pearl millet for different traits with randomized block design revealed valuable genotypes of various characters for specific breeding objectives. The genotype PBLN-2021-208 (53 days) followed by PBLN-2021-212 (53.5 days), PBLN-2021-205 (54 days), DHLB-36B (55.5 days), DHLB-28B (56.5 days) and PBLN-2021-206 (56.5 days) had found at par for selection of days to 50 percent flowering. The genotype S-21/13 (66 days) followed by S-21/05 (67 days), S-21/06(67 days), ICMB-9544 (67.5 days) and S-21/12 (68 days) had found at par for selection of days to maturity. The genotype S-21/06 (93.5 cm) followed by S-21/05 (92.5 cm), PBLN-2021-204 (90.87 cm), PBLN-2021-209 (90.51 cm), S-21/13 (89.5 cm), PBLN-2021-211 (88.03 cm), PBLN-2021-210 (82.42 cm), PBLN-2021-205 (81.42 cm), PBLN-2021-208 (77.27 cm), and PBLN-2021-206 (76.67 cm) had found at par for selection of plant height at maturity. The genotype DHLB-23B(4.35 cm) followed by ICMB-13444 (4), DHLB-24(3.7) and ICMB-10889 (3.6) had found at par for selection of productive tillers per plant. Whereas, for selection of trait panicle girth the genotype ICMB-13444 (21.34 cm) found superior and no any other at par genotypes was found. The genotype S-21/07 (24.87 cm) followed by S-21/09 (24.83 cm), DHLB-10B (23.5 cm), S-21/11 (23.45 cm), S-21/06 (23.33 cm), S-21/13 (22.72 cm), S-21/08 (22.53 cm) and S-21/05 (22.52 cm) had found at par for selection of panicle length. While for selection of traits 1000 seed weight (g), Protein content (%), Iron content (ppm), Zinc content (ppm) the genotypes ICMB-13444 (14.2), DHLB-37B (12.78), ICMB-13444 (114.13), ICMB-13444 (62.32) found superior respectively, and there was not found any at par genotypes for respective traits. The genotypes DHLB-10B (111.17g) and ICMB-13444 (112.02g)

had found superior and at par for grain yield per plant. The genotypes S-21/05 (1.00),S-21/06 (1.00),S-21/18(1.00), DHLB-27B (1.50),DHLB-36B (1.50),S-21/07(1.50), S-21/11 (1.50),S-21/15 (1.50), DHLB-37B (2.00), S-21/04 (2.00), S-21/08 (2.00) and S-21/13(2.50) were found resistant to blast severity and at par for selection. The genotypes S-21/05 (1.00), PBLN-2021-203(1.00), PBLN-2021-206 (1.00), DHLB-31B (1.00),ICMB-9544(1.00),S-21/19 (2.16), S-21/17 (2.16), PBLN-2021-204 (2.67), PBLN-2021-211 (2.67), S-21/07 (2.88), S-21/10 (2.88), DHLB-16B (3.00), PBLN-2021-212 (4.44), S-21/20 (4.67) and S-21/18 (6.81)were found resistant to Downey mildew incidence and at par for selection. (Table 3)

Table 3: Promising Lines Identified for Different Characters in Pearl Millet

Sr. No.	Characters	Specification	Most Promising genotypes (At Par)
1	Days to 50 per cent flowering	< 57.18	PBLN-2021-208 (53), PBLN-2021-212 (53.5), PBLN-2021-205 (54), DHLB-36B (55.5), DHLB-28B (56.5), PBLN-2021-206 (56.5)
2	Days to maturity	<84.74	S-21/13 (66), S-21/05 (67), S-21/06(67), ICMB-9544 (67.5), S-21/12 (68)
3	Plant height at maturity (cm)	<123.68	PBLN-2021-206 (76.67), PBLN-2021-208 (77.27), PBLN-2021-205 (81.42), PBLN-2021-210 (82.42), PBLN-2021-211 (88.03), S-21/13 (89.5), PBLN-2021-209 (90.51), PBLN-2021-204 (90.87), S-21/05 (92.5),S-21/06 (93.5)
4	Productive tillers per plant	>3.06	ICMB-10889 (3.6), DHLB-24(3.7), ICMB-13444 (4), DHLB-23B (4.35)
5	Panicle girth (cm)	>13.79	ICMB-13444 (21.34)
6	Panicle length (cm)	>21.56	S-21/05 (22.52), S-21/08 (22.53), S-21/13 (22.72), S-21/06 (23.33), S-21/11 (23.45), DHLB-10B (23.5), S-21/09 (24.83),S-21/07 (24.87)
7	1000 seed weight (g)	>10.26	ICMB-13444 (14.2)
8	Protein content (%)	>10.68	DHLB-37B (12.78)
9	Iron content (ppm)	>73.66	ICMB-13444 (114.13)
10	Zinc content (ppm)	>53.32	ICMB-13444 (62.32)
11	Grain Yield per plant (g)	>51.98	DHLB-10B (111.17), ICMB-13444 (112.02)
12	Blast severity (%)	<8.80	S-21/05 (1.00),S-21/06 (1.00),S-21/18(1.00), DHLB-27B (1.50),DHLB-36B (1.50),S-21/07(1.50), S-21/11 (1.50),S-21/15 (1.50), DHLB-37B (2.00), S-21/04 (2.00), S-21/08 (2.00), S-21/13(2.50)
13	Downey Mildew (%)	<13.18	S-21/05 (1.00), PBLN-2021-203(1.00), PBLN-2021-206 (1.00), DHLB-31B (1.00),ICMB-9544(1.00), S-21/19 (2.16), S-21/17 (2.16), PBLN-2021-204 (2.67), PBLN-2021-211 (2.67), S-21/07 (2.88), S-21/10 (2.88), DHLB-16B (3.00), PBLN-2021-212 (4.44), S-21/20 (4.67), S-21/18 (6.81)

Table 4: Comparison Based on Mean Performance

Sr. No.	Genotype	Days to 50 per cent Flowering	Days to maturity	Plant height at maturity (cm)	Productive tillers/ plant	Panicle girth (cm)	Panicle length (cm)	1000 Seed Weight (g)	Protein percent	Iron content (ppm)	Zinc content (ppm)	Grain yield per plant (g)	Blast severity (%)	Downey mildew (%)
1	Highest	S-21/12(68.0)	S-21/12 (96.50)	S-21/05(218.23)	DHLB-23B(4.35)	S-21/04(19.65)	S-21/07 (24.87),	ICMB-13444 (14.20)	DHLB-37B (12.78)	ICMB-13444 (114.13)	ICMB-13444 (62.32)	ICMB-13444 (112.02)	ICMB-9544 (50.50)	DHLB-15B (48.68)
		ICMB-9544(67.50)	ICMB-9544 (97.50)	DHLB-10B(212.5)	ICMB-13444(4.0)	S-21/07(19.6)	S-21/09 (24.83)	DHLB-10B (13.37)	S-20/01 (12.69)	ICMB-10889 (105.84)	ICMB-10889 (60.13)	DHLB-10B (111.17)	DHLB-16B (31.00)	S-21/08 (46.92)
2	Average	DHLB-10B(61.50)	DHLB-31B(90.00)	DHLB-15B(141.5),	DHLB-32B (2.60)	DHLB-27B(11.85)	DHLB-8B (17.88)	PBLN-2021-209 (9.74)	PBLN-2021-209 (9.62),	S-21/19 (69.69),	PBLN-2021-212 (49.73)	DHLB-31B (43.86)	S-20/01 (11.50)	DHLB-28B (18.12)
3	Lowest	PBLN-2021-212 (53.50),	PBLN-2021-212(83.50)	ICMB-9544(46.7)	ICMB-9544(1.10)	ICMB-9544(5.02),	ICMB-9544(5.6)	ICMB-9544 (6.05)	DHLB-8B (6.12)	ICMB-9544 (33.52),	ICMB-9544 (27.38),	ICMB-9544 (7.97)	S-21/05 (1.00),	DHLB-31B (1.00),
		PBLN-2021-208(53.00)	PBLN-2021-208(83.00)	PBLN-2021-206(76.67)	PBLN-2021-206(1.30)	PBLN-2021-210(8.10)	PBLN-2021-207 (8.17)	S-21/16 (6.51)	DHLB-23B (6.56)	PBLN-2021-211 (38.07)	DHLB-10B (31.63),	DHLB-32B (10.45)	S-21/06 (1.00),	ICMB-9544 (1.00)
4	(Check)DHLB-8B	61.00	90.50	105.71	2.90	10.60	17.88	7.36	6.12	75.42	43.01	39.98	14.50	39.44
5	Check(Blast)ICMB-9544	67.50	97.50	46.72	1.10	5.02	5.26	6.05	6.56	33.52	27.38	7.97	50.50	1.00
6	Mean	61.22	89.76	142.50	2.54	11.80	17.46	9.67	9.33	68.72	49.30	42.26	10.70	19.38
7	S.E.	1.42	1.77	6.62	0.18	0.70	1.44	0.21	0.47	1.74	1.41	3.42	0.66	2.18
8	C.D. 5%	4.04	5.02	18.82	0.52	1.99	4.10	0.59	1.35	4.94	4.02	9.72	1.90	6.20
9	C.V.	3.29	2.78	6.57	10.28	8.40	11.68	3.05	7.20	3.58	4.05	11.45	8.80	15.91

Table 5: Tentative suggested crossing programme in future

Sr. Number	Characters to be improved	Cluster combination with inter-cluster distance	Genotypes Possible	Crosses
1.	Earliness (50 flowering), (Days to maturity)	V x IX=23.87	DHLB-28B, ICMB13444, ICMB-10889	DHLB-28B X ICMB-13444 DHLB-28B X ICMB-10889
		VxVIII=24.87	DHLB-28B, S-21/16	DHLB-28B x S-21/16
2	Plant height (Mid Tall)	II XVII =19.33	S-21/03, DHLB-35B	S-21/03 x DHLB-35B
3.	Productive tillers per plant	IX x VI =24.96	ICMB-13444, ICMB-10889, DHLB24-B	ICMB-13444x DHLB-24B ICMB-10889 x DHLB-24B
4.	Panicle length (cm)	X x IV=17.12	DHLB-10B, S-21/10, S-21/11, S-21/14, S-21/05, S-21/13, S-21/17,S-21/06	DHLB-10Bx S-21/11 DHLB-10Bx S-21/77 DHLB-10Bx S-21/05 DHLB-10Bx S-21/14
5.	Panicle girth (cm)	IX x VI =24.96	ICMB-13444, ICMB-10889, DHLB24-B	ICMB-13444 x DHLB-24B ICMB-10889 x DHLB-24B
6.	Test seed weight (g)	X x IX =31.10	ICMB-13444, ICMB-10889 DHLB-10B	DHLB-10B X ICMB-13444 DHLB-10B X ICMB-10889
7.	Protein (maximum)	VII x III= 28.58	DHLB-35B, DHLB-32B	DHLB-35B x DHLB-32B
8.	Iron content	IX x VII = 23.91	ICMB-13444, ICMB-10889, DHLB-35B	ICMB-13444 x DHLB-35B ICMB-10889 x DHLB-35B
9	Zinc content	IX x V = 23.87	ICMB-13444, ICMB-10889, DHLB-28B	ICMB-13444 x DHLB-28B ICMB-10889 x DHLB-28B
10	Grain yield (g) maximum	X x IX = 31.10	ICMB-13444, ICMB-10889 DHLB-10B	DHLB-10B X ICMB-13444 DHLB-10B X ICMB-10889

These genotypes were found distinct and diverse and can be classified as promising genotypes. These genotypes can be used for inter-crossing to obtain wider variability in pearl millet
ICMB-13444 ICMB-10889
PBLN-2021-208 PBLN-2021-21
DHLB-23B S-21/05
S-21/07 S-21/09

References

1. AICPMIP (All India Coordinated Pearl Millet Improvement Project) Annual Report 2002-2016
2. Allard RW. Principles of plant breeding. John. Wiley and Sons.Inc. New York, 1960, 20-24 and 88-89.
3. Annamalai R, Ananthi N, Arumugam Pillai M, Leninraja D. Assessment of variability and character association in pearl millet [*Pennisetum glaucum* (L) R.Br.]. International Journal of Current Microbiology and Applied Science. 2020;9(6):3247-3259.
4. Anonymous. Directorate of economics and statistics, DAC & FW Agricultural Statistics at A Glance, 2020, 57.
5. Anonymous. India Agristat, an associate website of Indistat. Com; c2019-2020.
6. Cochran WG, Cox GM. Experimental designs. Johan Wiley and Sons, N. Y London, 1957, 82-90 and 403-412.
7. Dadarwal SL, Rajput SS, Yadav GL. Studies on correlation and path analysis for grain yield and its components in maintainer lines of pearl millet [*Pennisetum glaucum* (L) R. Br.]. Indian Journal of Current Microbiology and Applied Science. 2020;9(12):1158-1164.
8. Mahalanobis PC. On the generalized distance in statistics. Proc. National Academy, Sci., 1936;2:55-79.
9. Rao CR. Advanced statistical methods in biometrical research. John Wiley and sons, New York, 1952, 379.
10. Rasitha RK, Iyanar Ravikesavan R, Senthil N. Studies on genetic parameters, correlation and path analysis for yield attributes in the maintainer and restorer lines of pearl millet [*Pennisetum glacum* (L.) R.Br] Electronic Journal of Plant Breeding. 2019;10(2):382-388.
11. Rateesh Krishanan, Meera MS. Monitoring bioaccessibility of iron and zinc in pearl millet grain after sequential milling. Journal of Food Science and Technology. 2022;59(2):784-795.
12. Wilks SS. Csertain generalization in the analysis of variance. Biometrics. 1932;24:471-494.
13. World Health Organization; c2016.
14. Wright S. Correlation and causation. Journal of Agricultural Research. 1921;20:557-585.
15. Yahaya Y, Echekwu CA, Mohammed SG. Genetic variability and path coefficient analysis in pearl millet [*Pennisetum glaucum* (L) R.Br.]. African Journal of Agronomy. 2015;3(1):224-227.
16. Subbulakshmi P, Prakash M. Mitigating eavesdropping by using fuzzy based MDPOP-Q learning approach and multilevel Stackelberg game theoretic approach in wireless CRN. Cognitive Systems Research. 2018 Dec 1;52:853-61.
17. Mahalingam S, Matharu R, Homer-Vanniasinkam S, Edirisinghe M. Current methodologies and approaches for the formation of core–sheath polymer fibers for biomedical applications. Applied Physics Reviews. 2020 Dec 14;7(4):041302.
18. Mithlesh Kumar, *et al*. Multivariate diversity analysis for grain micronutrients concentration, yield and agro-morphological traits in pearl millet (*Pennisetum glaucum* (L) R. Br.). Int. J Curr. Microbiol. Appl. Sci 9.3 (2020): 2209-2226. 2020;9(3):2209-2226.
19. Chauhan G, Madou MJ, Kalra S, Chopra V, Ghosh D, Martinez-Chapa SO. Nanotechnology for COVID-19: therapeutics and vaccine research. ACS nano. 2020 Jun 22;14(7):7760-7782.