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Waghai white Nagli-55 (WWN-55): High grain yielding, Multiplier, Multi finger, long finger, bold grain white finger millet (*Eleusine coracana* L. Gaertn) genotype

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Abstract

A total of 36 white finger millet accessions constituted of 27 landraces and nine released varieties were evaluated for 12 morphological characters including grain yield at Hill Millet Research Station, Waghai; Niger Research Station, Varanasi under Navsari Agricultural University, Navsari and Hill Millet Research Station, Dahod under Anand Agricultural University at Gujarat, during *Kharif* 2018, 2019 and 2020. The objectives were to assess the genetic potential through the variability, correlation analysis among the quantitative traits. This research was carried out using randomized block design with three replications at each location. The pooled data of all three locations where used to study the genetic potential of white finger millet genotypes. Moderate genotypic and phenotypic coefficient of variation found for the traits *viz.*, number of fingers per earhead, number of productive tillers per plant, straw yield per plant, grain yield per plant, finger length, harvest index and main earhead indicating ample scope of variation for these traits, allowing further improvement by selection of these traits. Low value of genotypic coefficient of variation and phenotypic coefficient of variation was found for the traits *viz.*, days to 50% flowering, finger width, days to maturity, plant height and 1000 grain weight indicating low variability for these traits. High heritability estimates were observed for days to 50% flowering, days to maturity, plant height, number of productive tillers per plant, number of fingers per earhead, main earhead length, finger length, 1000 grain weight, grain yield per plant, straw yield per plant and harvest index showing low environmental influence on these traits and presence of additive gene action for these traits. Hence, priority can be given to these traits during selection to get more genetic gains. Genotypes *viz;* WWN 55 followed by GN 5 and GNN-7 were high yielding among all thirty six genotypes of white finger millet so they can be considered for varietal development and release for further selection. Thus, WWN 55 is multifinger (10.13), long finger length (12.27 cm), bold grain (3.14 g), mutitiller (7.93) white seeded high yielding (11.85 g) promising finger millet genotype with moderately resistance to pest and diseases found during three years of genetic evaluation at three different locations which used as a promising parent in further breeding programme.

Keywords: White finger millet, variability, quantitative traits, multi whorl-long finger, bold white grain

Introduction

Finger millet [*Eleusine coracana* (L.) Gaertn.] Subspecies coracana belongs to family *Poaceae*. It is an important cereal crop amongst the small millets and ranks third in importance among millets in the country in area and production after sorghum and pearl millet. Finger millet is very adaptable and thrives at higher elevations than other tropical cereals and adapted for its valued food grains. Small Millets have adaptability to wide range of geographical areas and agro-ecological diversity makes it more versatile. (Patel *et al.* 2018) [19, 21]

Finger millet is an important 'Nutricereal' because of its excellent nutritive value of the grains and the storage properties. Finger millet is a good source of micronutrients and dietary fibres and consumed both in native and processed form (Rao and Murlikrishna, 2001) [23]. Finger millet grains contain higher levels of minerals like Ca, Mg, and K (Devi *et al.*, 2014) [7]. It also has high levels of amino acids like methionine, lysine and tryptophan (Bhatt *et al.*, 2011) [2] and polyphenols (Chandrasekara and Shahidi, 2011) [3]. With high fiber and protein content, millets are preferred as dietary foods for people with diabetes and cardiovascular diseases (Patil *et al.* 2019) [20]. Finger millet straw makes good fodder and contains up to 61 per cent total digestible nutrients.

Genetic variability is important for improvement of any crop through selection. More variability leads to more genetic gain through selection. The basic information on the existence of genetic variability and diversity in a population and the relationship between different traits is essential for any successful plant breeding programme. Due to these reasons this study was done to assess variability by taking different parameters *viz.*, Phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability and genetic advance. Knowledge of correlation between yield and its component traits may be helpful in selection of suitable plant type. For obtaining the information on actual contribution of each character to yield, it is necessary to partition the correlation analysis. Therefore, correlation analysis would help in identifying suitable selection criteria for improving the yield. Hence, the present investigation will be undertaken to characterize the germplasm accessions, to assess the variability and to determine the interrelationship among yield and its contributing characters in white finger-millet.

Material and Methods

This research was conducted at Hill Millet Research Station, Waghai; Niger Research Station, Vanarasi under Navsari Agricultural University, Navsari and Hill Millet Research Station, Dahod under Anand Agricultural University at Gujarat, during *Kharif* 2018, 2019, 2020. Experimental material comprised of thirty-six diverse genotypes of white finger millet. These genotypes were laid out in Randomized Block Design along with respective checks in three replications. The seedlings were planted at 22.5×7.5 cm^2 spacing. Five randomly selected plants from each genotype in each replication were used to record observations for morphological characters. The pooled data of all three locations where used to study the genetic potential of white finger millet. Also, as all the national released varieties (PR-505, GPU-45, GPU-27, VL-352) are red coloured hence two white seeded local released varieties (GN-5 and GNN-7) have been taken for finding out best promising white finger millet genotype.

Genetic variability analysis of each quantitative trait was carried out using different variability parameters. Phenotypic, genotypic and environmental variances were estimated according to the methods suggested by Johnson *et al.* (1955[a]) [12] and Phenotypic and genotypic coefficient of variation were calculated using formulae suggested by Cockerham (1963) [4], whereas estimation of heritability and expected genetic advance were computed using the formula according to Allard (1960) [1] and Johnson *et al.* (1955[b]) [13], respectively. Analysis of covariance for all possible pairs of fourteen characters was carried out using the procedure of Panse and Sukhatme (1978) [17] for each family. The cause and effect relationship between two variables cannot be known from simple correlation coefficient.

Result and Discussion

Analysis of Variance

The analysis of variance indicating the mean sum of squares for all the twelve characters studied, are summarised in Table 1. The genotypic differences were highly significant for all the twelve characters indicating considerable amount of genetic variability among the genotypes tested in the present study, suggesting ample scope for improvement of yield and various yield attributing characters.

Mean performance of genotypes

The mean performance of all thirty-six genotypes for twelve characters is shown in Table 5. The variability parameters like mean, range, genotypic, phenotypic and environmental variances for twelve characters are presented in Table 2. Similarly, phenotypic coefficient of variation and genotypic coefficients of variation for all the characters are presented in table 3. From the mean table it can be concluded that, among thirty-six genotypes WWN 55 (11.85 g per plant) is high yielding followed by GN-5 and GNN-7. (Patil *et al.* 2018) [19, 21]. Thus, WWN 55 is multiwhorl (10.13), long finger length (12.27cm), mutitillered (3.93), bold grain (3.04 g) white seeded high yielding promising finger millet genotype with moderately resistance to pest and diseases found during three years of genetic evaluation at three different locations.

PCV and GCV estimates (Table 2)

The values of phenotypic coefficient of variation were higher than genotypic coefficient of variation for most of the characters indicating the influence of environmental factors. Moderate genotypic and phenotypic coefficient of variation found for the traits *viz.*, number of fingers per earhead, number of productive tillers per plant, straw yield per plant, grain yield per plant, finger length, harvest index and main earhead length. These results indicated the presence of wide variation for these characters under study to allow further improvement by selection of the individual traits. Moderate genotypic and phenotypic coefficient of variation for such traits were also observed by Saundaryakumari and Singh (2015) [24] for finger length, number of fingers per earhead and Devaliya *et al.* (2018) [6] for number of fingers per earhead, number of productive tillers per plant, main earhead length, grain yield per plant and straw yield per plant in finger millet while Patil *et al.* (2018) [19, 21] for panicle length in little millet. The lower value of genotypic coefficient of variation and phenotypic coefficient of variation observed for the traits *viz.*, days to 50% flowering, finger width, days to maturity, plant height and 1000 grain weight indicating the presence of low variability for these traits. Similar results were also obtained by Suryanarayana *et al.* (2014) [26] for days to 50% flowering and days to maturity and Devaliya *et al.* (2018) [6] for days to 50% flowering, days to maturity, plant height and 1000 grain weight in finger millet while Jyotsna *et al.* (2016) [14] for plant height and days to maturity and Patil *et al.* (2017) for plant height in little millet. In the present study, the difference between PCV and GCV were lower for the characters *viz.*, days to 50%flowering, days to maturity, plant height, number of fingers per earhead, main earhead length, finger length and 1000 grain weight suggesting negligible role of environment in the expression of traits, therefore improvement by phenotypic selection is possible.

Table 1: Analysis of variance for twelve traits in thirty-six genotypes of white Finger millet.

Source of variation	Degree of freedom	DF	DM	PH	PTP	FPE	MEL	FL	FW	TW	GY	SY	HI
Replication	2	6.40	30.73	32.21	0.05	0.27	0.32	0.91	0.003	0.001	1.32	4.22	7.47
Genotypes	35	258.03**	301.37**	185.44**	0.85**	5.85**	3.57**	2.95**	0.02**	0.07**	5.32**	45.42**	40.87**
Error	70	22.23	40.39	29.48	0.16	0.41	0.19	0.32	0.01	0.004	0.68	4.10	6.48
S.Em.±	-	2.72	3.67	3.13	0.24	0.37	0.25	0.33	0.05	0.04	0.48	1.17	1.47

C.D at 5%	-	7.68	10.35	8.84	0.66	1.04	0.71	0.92	0.14	0.11	1.35	3.30	4.15
C.D at 1%	-	10.19	13.74	11.74	0.88	1.38	0.95	1.23	0.18	0.14	1.79	4.38	5.50
C.V %	-	5.12	5.02	4.52	14.40	9.41	4.85	7.88	10.12	2.44	9.98	8.64	9.66

*significant at 5% level
**significant at 1% level

DF	Days to 50% flowering	PTP	No. of productive tillers per plant	FL	Finger length (cm)	GY/P	Grain yield per plant (g)
DM	Days to maturity	FPE	Number of fingers per earhead	FW	Finger width (cm)	SY/P	Straw yield per plant (g)
PH	Plant height (cm)	MEL	Main ear head length (cm)	TW	1000-Grain weight (g)	HI	Harvest index (%)

Table 2: Range, mean and components of variance for twelve traits in thirty-six genotypes of white Finger millet

Sr. No.	Characters	Range	Mean	Component of variance		
				Genotypic	Phenotypic	Environmental
1.	Days to 50% flowering	67.67-112	92.04	78.60	100.83	22.23
2.	Days to maturity	105.33-145	126.55	87.00	127.38	40.39
3.	Plant height (cm)	92-136.4	120.13	51.99	81.47	29.48
4.	Number of productive tillers per plant	1.83-3.8	2.83	0.23	0.39	0.16
5.	Number of fingers per earhead	5.1-11	6.79	1.81	2.22	0.41
6.	Main earhead length (cm)	6.77-11.43	9.03	1.13	1.32	0.19
7.	Finger length (cm)	5.4-10.27	7.19	0.88	1.20	0.32
8.	Finger width (cm)	0.67-1.03	0.84	0.005	0.012	0.007
9.	1000-Grain weight (g)	2.37-3.04	2.69	0.023	0.027	0.004
10.	Grain yield per plant (g)	5.20-10.85	8.29	1.54	2.23	0.68
11.	Straw yield per plant (g)	14.82-33.22	23.43	13.77	17.87	4.10
12.	Harvest index (%)	19.64-34.20	26.35	11.46	17.94	6.48

Table 3: Genotypic and phenotypic coefficient of variation, heritability, genetic advance and genetic advance as per cent of mean for twelve traits in thirty-six genotypes of white Finger millet.

Sr. No.	Characters	GCV%	PCV%	Heritability (Broad sense %)	Genetic advance	Genetic advance (% of mean)
1.	Days to 50% flowering	9.633	10.91	77.956	16.125	17.521
2.	Days to maturity	7.371	8.919	68.294	15.878	12.547
3.	Plant height (cm)	6.002	7.513	63.813	11.865	9.877
4.	Number of productive tillers per plant	16.973	22.057	59.217	0.761	26.906
5.	Number of fingers per earhead	19.837	21.956	81.626	2.507	36.919
6.	Main earhead length (cm)	11.755	12.718	85.432	2.021	22.382
7.	Finger length (cm)	13.024	15.222	73.205	1.651	22.955
8.	Finger width (cm)	8.664	13.32	42.304	0.097	11.608
9.	1000-Grain weight (g)	5.607	6.115	84.093	0.285	10.593
10.	Grain yield per plant (g)	14.997	18.015	69.296	2.131	25.717
11.	Straw yield per plant (g)	15.839	18.042	77.068	6.712	28.644
12.	Harvest index (%)	12.848	16.073	63.902	5.576	21.158

Heritability and Genetic Advance Estimates

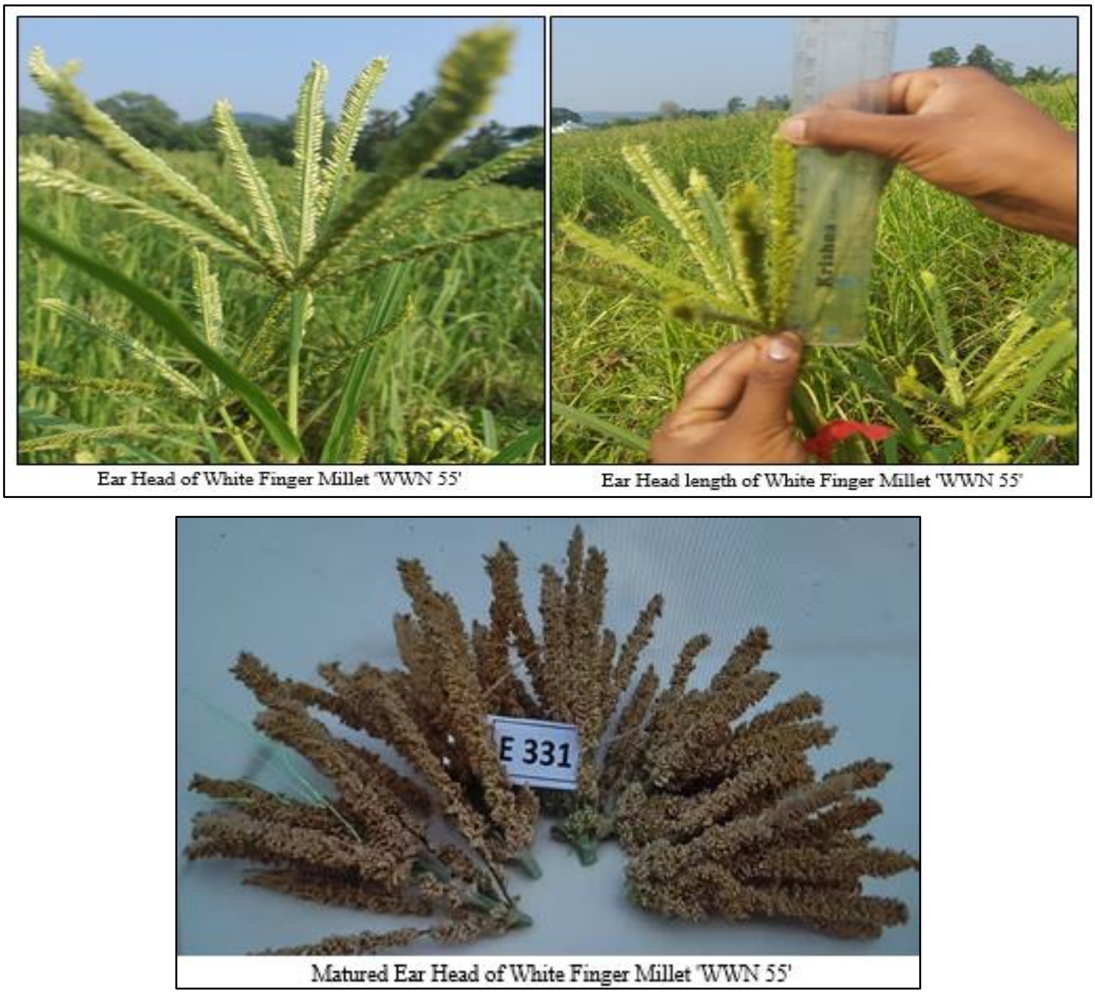
High heritability estimates were noticed for days to 50% flowering, days to maturity, plant height, number of productive tillers per plant, number of fingers per earhead, main earhead length, finger length, 1000 grain weight, grain yield per plant, straw yield per plant and harvest index indicating that these characters are less influenced by the environmental fluctuations and largely governed by additive genes, so selection could be rewarding for improvement of such yield attributes. Moderate heritability estimates were observed for finger width revealing higher environmental influence in the expression these traits. Genetic advance expressed as percentage of mean was observed high for number of number of fingers per earhead, productive tillers per plant, grain yield per plant, straw yield per plant, main earhead length, finger length and harvest index and was recorded moderate for characters *viz.*, days to 50% flowering, days to maturity and 1000 grain weight. However, plant height had recorded low genetic advance as expressed as percentage of mean. (Table 3)

In present investigation, high heritability coupled with high genetic advance was observed for the traits *viz.*, number of fingers per earhead, number of productive tillers per plant, main earhead length, finger length, grain yield per plant, straw yield per plant and harvest index indicating that these characters were governed by additive gene action, hence, there are good chances of improvement of these traits through direct selection. High value of heritability associated with low genetic advance as percentage of mean was found for plant height showed the predominance of non-additive gene action in the expression of this trait. Hence, breeder should use suitable methodology to use both additive and non-additive gene action simultaneously for significant improvement. The characters *viz.*, days to 50% flowering, days to maturity and 1000 grain weight showed high heritability coupled with moderate genetic advance as per cent of mean. High heritability accompanied with moderate genetic advance as per cent of mean indicated that the genotypes under study were diverse with immense genetic potential and further improvement in this trait is possible by adopting simple selection technique.

The results of present study, which revealed comparative higher degree of genotypic correlation coefficients than their phenotypic counterparts in most of the characters, indicated that there was a higher degree of association between two characters of genotypic association. Whereas, their phenotypic association was lessened due to the influence of environment. However, in few cases, the phenotypic correlation was slightly higher than their genotypic counterparts, which implied that the non-genetic cause inflated the value of genotypic correlation because of the influence of the environmental factors.

Correlation

In the present investigation, grain yield per plant was found to be highly significant and positively correlated with plant height, number of productive tillers per plant, 1000 grain weight, straw yield per plant and harvest index at both genotypic and phenotypic levels and finger width had highly significant correlation with grain yield per plant at genotypic level indicating that these attributes were mainly influencing the grain yield in finger millet. (Table 4) Thus, selection practiced for the improvement in a character will automatically result in the improvement of other character even though direct selection for improvement has not been made for the yield character. Similar results exhibiting highly significant and positive correlation between grain yield and other traits as obtained in the present investigation were also reported by Shet *et al.* (2010) [25] for finger width and 1000 grain weight; Haradari *et al.* (2012) [9] for plant height and number of productive tillers per plant; Dhamdhere *et al.* (2013) [8] for straw yield per plant; Devaliya *et al.* (2018) [6] for number of productive tillers per plant and straw yield per plant in finger millet.The grain yield per plant expressed significant positivecorrelation with traits, number of fingers per earhead at both genotypic and phenotypic levels and finger length at genotypic levelin present investigation, which were also displayed by John (2007) [11], Wolie and Dessalegn (2011) [27] for number of fingers per earhead.



Ear Head of White Finger Millet 'WWN 55'

Ear Head length of White Finger Millet 'WWN 55'

Matured Ear Head of White Finger Millet 'WWN 55'

Fig 1: Photographs of Best Promising line WWN 55 in White Finger Millet genotype

Table 4: Genotypic and phenotypic correlations of grain yield per plant with other characters in thirty-six genotypes of White Finger millet.

Characters		DF	DM	PH	PTP	FPE	MEL	FL	FW	TW	SY/P	HI
GY/P	Rg	0.072^{NS}	0.110^{NS}	0.433^{**}	0.388^{**}	0.201^{*}	0.139^{NS}	0.195^{*}	0.281^{**}	0.800^{**}	0.342^{**}	0.512^{**}
	Rp	0.044^{NS}	0.054^{NS}	0.350^{**}	0.334^{**}	0.219^{*}	0.155^{NS}	0.182^{NS}	0.110^{NS}	0.632^{**}	0.291^{**}	0.557^{**}
DF	Rg	1.000	1.045^{**}	0.146^{NS}	0.116^{NS}	-0.496^{**}	0.408^{**}	0.495^{**}	0.014^{NS}	0.016^{NS}	0.530^{**}	-0.428^{**}
	Rp	1.000	0.847^{**}	0.112^{NS}	0.009^{NS}	-0.398^{**}	0.327^{**}	0.418^{**}	-0.018^{NS}	0.029^{NS}	0.386^{**}	-0.284^{**}
DM	Rg		1.000	0.140^{NS}	-0.002^{NS}	-0.480^{**}	0.439^{**}	0.609^{**}	0.076^{NS}	0.026^{NS}	0.553^{**}	-0.413^{**}
	Rp		1.000	0.024^{NS}	0.016^{NS}	-0.343^{**}	0.316^{**}	0.420^{**}	0.024^{NS}	0.041^{NS}	0.386^{**}	-0.266^{**}
PH	Rg			1.000	0.147^{NS}	-0.176^{NS}	0.120^{NS}	0.190^{*}	0.193^{*}	0.176^{NS}	0.538^{**}	-0.150^{NS}
	Rp			1.000	0.057^{NS}	-0.113^{NS}	0.169^{NS}	0.182^{NS}	0.123^{NS}	0.155^{NS}	0.431^{**}	-0.097^{NS}
PTP	Rg				1.000	-0.147^{NS}	-0.118^{NS}	-0.175^{NS}	0.049^{NS}	0.326^{**}	-0.060^{NS}	0.339^{**}
	Rp				1.000	-0.147^{NS}	-0.118^{NS}	-0.155^{NS}	0.082^{NS}	0.245^{*}	-0.028^{NS}	0.272^{**}
FPE	Rg					1.000	-0.100^{NS}	-0.267^{**}	-0.183^{NS}	0.135^{NS}	-0.391^{**}	0.563^{**}

	Rp					1.000	-0.037^{NS}	-0.154^{NS}	-0.129^{NS}	0.127^{NS}	-0.303**	0.457**
MEL	Rg						1.000	0.922**	-0.000^{NS}	-0.013^{NS}	0.038^{NS}	0.054^{NS}
	Rp						1.000	0.819**	0.012^{NS}	0.016^{NS}	0.057^{NS}	0.068^{NS}
FL	Rg							1.000	0.208*	-0.002^{NS}	0.265**	-0.073^{NS}
	Rp							1.000	0.133^{NS}	0.015^{NS}	0.259**	-0.072^{NS}
FW	Rg								1.000	0.167^{NS}	0.302**	-0.012^{NS}
	Rp								1.000	0.151^{NS}	0.185^{NS}	-0.040^{NS}
TW	Rg									1.000	0.150^{NS}	0.531**
	Rp									1.000	0.121^{NS}	0.405**
SY/P	Rg										1.000	-0.623**
	Rp										1.000	-0.617**
HI	Rg											1.000
	Rp											1.000

** Significant at 1% level * Significant at 5% level

DF	Days to 50% flowering	PTP	No. of productive tillers per plant	FL	Finger length (cm)	GY/P	Grain yield per plant (g)
DM	Days to maturity	FPE	Number of fingers per earhead	FW	Finger width (cm)	SY/P	Straw yield per plant (g)
PH	Plant height (cm)	MEL	Main ear head length (cm)	TW	1000-Grain weight (g)	HI	Harvest index (%)

Table 5: Mean values or average of three years (2018, 201 and 2020) over three locations (Waghai, Vanarasi, Dahod) for twelve quantitative characters of white finger millet. (Data taken as per DUS guidelines)

Sr. No.	Genotypes	DF	DM	PH	PTP	FPE	MEL	FL	FW	TW	GY	SY	HI
1.	WWN 15	105.67	141.33	122.20	4.20	7.77	10.17	7.73	0.83	2.58	6.75	26.66	20.18
2.	WWN 28	77.00	109.67	113.47	5.90	8.13	9.17	6.53	0.87	2.74	9.61	18.53	34.20
3.	WWN 32	89.00	119.67	129.93	4.77	6.53	9.33	6.60	0.80	2.73	7.42	22.40	24.98
4.	WWN 34	92.00	124.00	130.00	3.57	7.20	9.03	6.60	0.80	2.64	9.61	26.64	26.37
5.	WWN 35	91.00	123.67	111.53	5.33	5.53	9.47	7.00	0.73	2.55	6.75	21.04	24.32
6.	WWN 36	92.33	127.33	127.07	3.97	6.63	10.47	8.73	0.93	2.60	7.74	26.01	22.91
7.	WWN 37	84.00	115.67	120.67	3.57	5.17	6.77	5.40	0.77	2.53	6.55	24.02	21.45
8.	WWN 38	86.00	120.33	121.67	4.60	8.05	8.50	6.53	0.70	2.74	9.97	22.82	30.56
9.	WWN 39	99.67	134.33	122.00	4.83	5.70	9.90	7.93	0.77	2.47	6.94	19.42	26.37
10.	WWN 40	87.00	119.67	92.00	5.33	8.17	8.77	6.07	0.67	2.38	5.20	15.45	25.29
11.	WWN 41	86.33	118.67	111.87	4.83	9.23	8.67	7.20	0.77	2.79	8.16	18.17	31.05
12.	WWN 42	99.67	133.67	123.73	3.73	6.20	9.63	7.20	0.80	2.64	7.49	19.04	28.26
13.	WWN 43	106.00	142.67	114.40	3.10	6.93	10.07	8.07	0.83	2.56	6.96	17.55	29.03
14.	WWN 44	87.00	122.67	126.60	5.80	7.07	9.67	7.73	0.97	3.00	9.84	24.64	28.56
15.	WWN 45	90.00	123.33	123.87	5.27	5.73	10.10	8.33	0.83	2.75	8.85	22.27	28.43
16.	WWN 46	68.67	106.67	106.13	3.60	7.97	7.80	6.27	0.87	2.68	7.36	14.82	33.21
17.	WWN 47	84.00	117.00	136.40	3.07	8.40	9.13	7.13	0.87	2.50	8.84	24.16	26.80
18.	WWN 48	99.00	137.33	119.07	4.97	6.10	11.43	8.27	0.87	2.55	8.80	27.27	24.38
19.	WWN 49	102.33	145.00	123.47	4.43	5.93	9.93	8.27	0.83	2.67	8.89	28.15	24.01
20.	WWN 50	85.67	118.00	128.80	3.33	7.83	8.77	6.93	0.80	2.84	8.53	19.43	30.54
21.	WWN 51	99.00	132.00	126.47	5.13	5.47	7.43	8.80	0.90	2.51	8.21	28.40	22.44
22.	WWN 52	96.67	129.33	112.40	4.80	5.10	7.73	6.27	1.03	2.62	6.91	20.54	25.22
23.	WWN 53	100.00	140.33	117.87	4.27	5.77	7.63	6.87	0.87	2.73	8.19	25.66	24.10
24.	WWN 54	112.00	145.00	120.73	5.87	6.47	6.90	6.13	0.93	2.75	8.87	33.22	21.15
25.	WWN 55	97.00	130.00	119.80	7.93	10.13	12.27	9.07	1.31	3.04	11.85	24.52	32.15
26.	WWN 56	94.00	127.67	120.40	4.57	5.63	8.93	7.13	0.77	2.64	6.76	27.69	19.64
27.	WWN 57	96.33	130.33	116.87	5.73	5.80	9.17	7.33	0.73	2.78	7.34	26.37	21.78
28.	GPU 45 (NC-Red)	85.67	118.67	123.67	6.90	8.23	8.10	6.13	0.73	2.55	8.11	22.79	23.84
29.	VL 352 (NC-Red)	67.67	105.33	117.80	4.23	8.33	7.07	5.73	1.03	2.58	7.16	23.77	23.43
30.	GPU 28 (NC-Red)	90.00	122.67	118.40	4.23	6.90	8.13	6.67	0.77	2.76	8.73	25.52	25.44
31.	PR 202 (NC-Red)	88.33	121.00	131.73	6.33	7.60	7.33	6.13	0.80	2.71	9.29	24.27	27.73
32.	GN-2 (LC-Red)	95.00	131.33	117.33	4.07	5.87	9.73	8.53	0.93	2.70	8.40	26.10	24.34
33.	GN-3 (LC-Red)	93.00	129.00	118.80	3.27	6.33	9.40	7.33	0.83	2.75	9.84	25.45	27.91
34.	GN-4 (LC-Red)	93.67	130.33	119.33	4.40	6.07	9.27	7.47	0.87	2.78	9.86	24.19	28.97
35.	GN-5 (LC-White)	97.33	129.33	119.40	6.53	6.00	9.40	7.27	0.93	2.87	9.42	23.33	31.81
36.	GNN-7 (LC-White)	95.33	127.33	119.40	6.47	8.53	10.07	7.33	0.90	2.98	10.01	23.22	30.24

DF	Days to 50% flowering	PTP	No. of productive tillers per plant	FL	Finger length (cm)	GY/P	Grain yield per plant (g)
DM	Days to maturity	FPE	Number of fingers per earhead	FW	Finger width (cm)	SY/P	Straw yield per plant (g)
PH	Plant height (cm)	MEL	Main ear head length (cm)	TW	1000-Grain weight (g)	HI	Harvest index (%)

Note: As all the national release varieties are red colour seeded hence during comparison two white seeded local released varieties (GN-5 & GNN-7) have been taken for comparison**.**

Conclusion

The analysis of variance for all the traits revealed differences among the genotypes studied, indicating sufficient amount of variability present among thirty-six genotypes under study. On the basis of genetic evaluations the WWN 55 is multifinger (10.13), long finger length (12.27 cm), bold grain (3.14 g), mutitiller (7.93) white seeded high yielding (11.85 g) promising finger millet genotype with moderately resistance to pest and diseases found during three years (2018, 2019 and 2020) of genetic evaluation at three different locations.

These genotypes could be further evaluated for isolating high yielding, early maturing and better genotype selection techniques. Moderate genotypic and phenotypic coefficient of variation found for the traits *viz.,* number of fingers per earhead, number of productive tillers per plant, straw yield per plant, grain yield per plant, finger length, harvest index and main earhead length. This indicated considerable amount of variability in the genotypes for these traits.High heritability estimates were noticed for days to 50% flowering, days to maturity, plant height, number of productive tillers per plant, number of fingers per earhead, main earhead length, finger length, 1000 grain weight, grain yield per plant, straw yield per plant and harvest index suggesting the existence of sufficient heritable variation and so selection based on phenotypic value could be effective for isolating better types. Genetic advance expressed as percentage of mean was observed high for number of number of fingers per earhead, productive tillers per plant, grain yield per plant, straw yield per plant, main earhead length, finger length and harvest index indicating presence of additive gene action for these traits. The high heritability coupled with high to moderate genetic advance expressed as percentage of mean for traits *viz.,* number of fingers per earhead, number of productive tillers per plant, main earhead length, finger length, grain yield per plant, straw yield per plant and harvest index, days to 50% flowering, days to maturity and 1000 grain weight may be attributed to the preponderance of additive gene action and these traits possess high selective value. The magnitudes of genotypic correlation were higher as compared to the corresponding phenotypic correlations for majority of studied traits of finger millet, thereby indicating the presence of an inherent relationship between the variables. Grain yield per plant was found to be significantly and positively correlated with plant height, number of productive tillers per plant, 1000 grain weight, straw yield per plant, harvest index and number of fingers per earhead at both genotypic and phenotypic levels while finger length at genotypic level only.

Thus, the genotypes *viz;* WWN 55 followed by GN 5 and GNN-7 were high yielding among all thirty six genotypes in finger millet so they can be considered for varietal development and release for further selection.

The final conclusion obtained from the studies on genetical analysis of white finger millet genotypes is that, number of productive tillers per plant, number of fingers per earhead, main earhead length and test weight are the most important characters for improvement of grain yield per plant, hence these traits should be considered as selection criteria for grain yield in white finger millet and WWN 55 is multifinger (10.13), long finger length (12.97 cm), bold grain (3.14 g), mutitiller (7.93) white seeded high yielding (11.85 g) promising finger millet genotype with moderately resistance to pest and diseases found during three years (2018, 2019 and 2020) of genetic evaluation at three different locations of Gujarat.

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