

# Study of Genetic variability for yield and yield attributing traits in Finger Millet (*Eleusine coracana* L. Gaertn)

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## ABSTRACT

The present investigation was carried out to assess the genetic variability, heritability, genetic advance, correlation coefficient analysis and path coefficient analysis in eighteen finger millet genotypes for seventeen yield and its contributing traits during *Kharif*, 2022 at Field Experimentation Centre, Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Uttar Pradesh in Randomized Block Design with 3 replications. The analysis of variance for mean sum of squares due to genotypes showed significant differences for all the 17 quantitative characters. The genotypes showed the highest mean performance for seed yield per plant IE 175 (13.42) followed by IE 165 (12.42), IE 169 (11.17), IE 136 (11.01). Whereas, genotypic and phenotypic coefficient of variation were found high for number of ears per plant and harvest index. high heritability coupled with high genetic advance as percent of mean was observed for days to 50% flowering, plant height, finger length, ear head length, test weight. Correlation coefficient revealed that seed yield per plant exhibited significant and positive correlations with number of fingers per ear, number of ears per plant, biological yield per plant, harvest index at both genotypic and phenotypic levels. Path Coefficient Analysis has revealed that number of fingers per ear, number of ears per plant, biological yield per plant, harvest index positive and direct effect on seed yield per plant at both genotypic and phenotypic levels. Hence the selection of genotypes based on the above-mentioned characters will be useful for crop improvement in Finger millet.

**Keywords:** Finger Millet, Genetic variability, Correlation coefficient, Path Coefficient analysis.

## INTRODUCTION

Finger millet (*Eleusine coracana* Gaertn L.) is an important millet crop that belongs to the family: Poaceae, subfamily: Chloridoideae, with chromosome number  $2n = 36$ . It is commonly known by various names such as ragi, nachani, and African millet. Finger millet is primarily cultivated in arid and semiarid regions of Africa and Asia, including countries like India, Uganda, Ethiopia, Nepal and Kenya. Finger millet is believed to have originated in East Africa, particularly in the highlands of Ethiopia and Uganda (Odeny, 2013). The origin of finger millet is traced back to the highlands of East Africa, specifically Ethiopia and Uganda (Amede *et al.*, 2014). Finger millet has a long history of cultivation in India. It is believed to have originated in East Africa and was introduced to India several thousand years ago. Finger millet has been an important traditional crop in India, particularly in the southern and central regions. Finger millet cultivation in India can be traced back to ancient times. Archaeological evidence suggests that finger millet was grown in the Indian subcontinent as early as 2000 BCE (National Bureau of Plant Genetic Resources [NBPGR], n.d.). India is the largest producer with an area, production and productivity of 1.19 million hectares, 1.98 million ton and 1661 kg per ha, respectively (Sood *et al.*, 2019). Finger millet is highly nutritious as its grains contain 65- 75% Carbohydrates, 5-8% protein, 15 -20% dietary fiber and 2.5-3.5% minerals. It also contains 5-8% eleusin, a quality protein, which our body can easily absorb. Ancient Indian texts like the Rigveda mention finger millet as a staple food. Traditional dishes made from finger millet, such as ragi mudha (finger millet balls), ragi roti (finger millet flatbread), and ragi malt (finger millet porridge), are part of the culinary heritage of many Indian communities (Zaveri & Gudigar, 2016). Worldwide cultivation of Finger millet is majorly grown in semi-arid tropics of Asia and Africa. More than 40.0% of global millet consumption is held by African countries mainly Niger, Mali, Nigeria, Burkina, and Sudan. Around 4.5 tons of finger millet are produced Worldwide every year (Ceasar *et al.*, 2018). Finger millet comprises 11% of India's total production of major millets, according to the 4th Advanced Estimates of Major Millet Production for the Period of 2021-2022. In India Finger millet is cultivated over an area of 14 million hectares with a production of 16.3 million tones giving an average productivity of 1561 kg per ha.

Agronomically and Environmentally Finger millet is beneficial to human kind and to soil respectively. Finger millet having the adaptability to diverse agro-ecological zones, including

arid and semiarid regions, it is highly valued. Finger millet has resilience to adverse climatic conditions has the ability to withstand drought, high temperatures, and poor soil fertility, making it an important crop in areas with limited agricultural resources (**Sharma et al., 2011**). Finger millet is typically grown as a rainfed crop, relying on rainfall for its water requirements (**Zaveri & Gudigar, 2016**). Finger millet exhibits excellent drought tolerance, allowing it to thrive in regions with limited water availability (**Sharma et al., 2011**). Finger millet has the ability to improve soil fertility through its root exudates, which enhance microbial activity and nutrient availability in the soil. Finger millet contributes to carbon sequestration by storing carbon in its aboveground biomass and root systems, thereby mitigating greenhouse gas emissions. The extensive root system of finger millet helps prevent soil erosion, particularly on slopes, by holding the soil together. Finger millet cultivation supports agrobiodiversity by preserving traditional landraces and genetic diversity within the crop (**Geddes et al., 2019**).

The yield of finger millet still has to be greatly improved. Therefore, the current research focuses on examining the Finger millet yield and the features that contribute to it. Additionally, identifying the best genotype to farm in the Prayagraj area, which influences millet improvement in Uttar Pradesh, a state that produces little millet.

## **MATERIALS AND METHODS**

The present investigation was carried out at the Field Experimentation Center of Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad), U.P. during Kharif, 2022. The university is situated on the left side of Allahabad Rewa National Highway, about 5km from Prayagraj city. All types of facilities necessary for cultivation of successful crop including field preparation inputs, irrigation facilities were provided from the Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad), U.P.

The 18 finger millet genotypes were grown in kharif-2022 in Randomized Block Design with three replications. Sowing for all the genotypes of finger millet was done on 20 July 2022. A spacing of 20 cm between rows and 10 cm between plants were given and the crop was raised as per the recommended package of practice. Among the 18 genotypes grown during kharif

2022, to analyze the effect of various traits for heritability, correlation, path analysis and genetic divergence on Grain yield over the years.

### **Experimental material:**

The present study consists of 18 Finger Millet genotypes including one check variety (table 1) which was grown in *kharif*-2022 at the Field Experimentation Centre, Department of Genetics and Plant Breeding, SHUATS, Prayagraj.

Table 1.

<b>S.NO.</b>	<b>GENOTYPES</b>	<b>S.NO.</b>	<b>GENOTYPES</b>
1	<b>IE 101</b>	10	<b>IE 163</b>
2	<b>IE 102</b>	11	<b>IE 165</b>
3	<b>IE 111</b>	12	<b>IE 168</b>
4	<b>IE 120</b>	13	<b>IE 169</b>
5	<b>IE 121</b>	14	<b>IE 170</b>
6	<b>IE 136</b>	15	<b>IE 172</b>
7	<b>IE 139</b>	16	<b>IE 174</b>
8	<b>IE 150</b>	17	<b>IE 175</b>
9	<b>IE 161</b>	18	<b>FIN 7669 (Check)</b>

## **RESULTS AND DISCUSSION**

Out of 18 genotypes of Finger Millet evaluated for various characters, all genotypes found to be superior for seed yield per plant over check variety FIN 7669. The genotypes IE 175 (13.42) followed by IE 165 (12.42), IE 169 (11.17), IE 136 (11.01) showed high mean performance for seed yield per plant. Phenotypic Coefficient of Variation (PCV) was observed for all the traits ranged from Days to Maturity (3.06) to Harvest Index (38.31). Similarly Genotypic Coefficient of Variation (GCV) was observed for all the traits ranged from Days to Maturity (2.94) to Harvest index (33.90). Very High heritability (broad sense) estimates (80% and above) had observed for Days to 50% Flowering (98.00), Finger Length (93.00), Days to Maturity (92.00), Plant Height (90.00), Ear Head Length (84.00), Flag Leaf Width (80.00), Test Weight (80.00). Higher heritability (60% and above) was recorded for Harvest Index (78.00), Number of Ears per Plant (76.00), Number of Fingers per Ear (67.00), Seed Yield per Plant (65.00). Therefore, these characters are predominantly governed by additive gene action and could be improved through individual plant selection owing to their high heritability values. Genetic advance as % of mean varied from 6.25 for Seed Yield per

Plant to 61.78 for Days to 50% Flowering. High genetic advance as % of mean (>20%) was recorded for Days to 50% Flowering (61.78), Days to Maturity (54.82), Plant Height (42.90), Flag Leaf Length (35.64), Number of Fingers per Ear (30.97), Number of Productive Tillers (28.58), Flag Leaf Width (27.24), Finger Length (20.19), Finger Width (20.03). Moderate genetic advance as % of mean (10-20%) was recorded for Ear Head Length (18.80). Low genetic advance as % of mean was recorded for Ear Head Width (9.02), Number of Ears per Plant (6.95), Peduncle Length (6.26), Biological Yield per Plant (5.94), Harvest Index (5.84), Test Weight (1.70), Seed Yield per Plant (6.25).

The results of present study also revealed that there was a comparative higher degree of genotypic correlation coefficients than their phenotypic counterparts in most of the characters studied. This indicated that there was a higher degree of association between two characters of genotypic association, their phenotypic association was lessened due to the influence of environment.

Genotypic Correlation coefficient analysis revealed that seed yield per plant exhibited significant and positive correlation with Flag Leaf Length (0.9922\*), Number of Fingers per Ear (0.472\*\*), Finger Width (0.6593\*), Ear Head Width (0.2747\*\*), Number of Ears per Plant (0.4862\*\*), Biological Yield per Plant (0.4688\*\*), Harvest Index (0.601\*).

Phenotypic correlation coefficient analysis revealed that seed yield per plant exhibit high significant and positive correlation with number of fingers per ear (0.3414\*\*), flag leaf with (0.4484\*), Number of ears per plant (0.5786\*\*), biological yield per plant (0.468\*\*), Harvest Index (0.5204\*\*).

Genotypic Path coefficient analysis revealed that maximum positive direct effect was due to its Flag Leaf Length (0.9922\*), Number of Fingers per Ear (0.472\*\*), Finger Width (0.6593\*), Ear Head Width (0.2747\*\*), Number of Ears per Plant (0.4862\*\*), Biological Yield per Plant (0.4688\*\*), Harvest Index (0.601\*). Days to Maturity (-0.5805\*) exhibited significant and negative correlation with seed yield per plant. Ear Head Length (0.0598), Peduncle Length (0.0999), Test Weight (0.2075) exhibited positive and non-significantly correlated with seed yield per plant. Days to 50% Flowering (-0.188), Plant Height (-0.2877), Flag Leaf Width (-0.0651), Finger Length (-0.155) exhibited non-significant and negative correlation with seed yield per plant.

Phenotypic Path coefficient revealed that maximum positive direct effect on seed yield was

depicted number of fingers per ear (0.3414\*\*), flag leaf with (0.4484\*), Number of ears per plant (0.5786\*\*), biological yield per plant (0.468\*\*), Harvest Index (0.5204\*\*). Number of productive tillers (0.2069), ear head width (0.247), peduncle length (0.0145), Test weight (0.132) exhibited non-significant but positive correlation with seed yield per plant. Days to 50% flowering (-0.1661), days to maturity (-0.4203), plant height (-0.1783) flag leaf length (-0.1348) and finger length (-0.1394), finger width (-0.1474), ear head length (-0.0133) were non-significantly and negatively correlated with seed yield per plant.

UNDER PEER REVIEW

**Table 2. Genetic parameters for 17 quantitative traits in Finger millet genotypes**

<b>Traits</b>	<b>GCV</b>	<b>PCV</b>	<b>% h<sup>2</sup> (Broad Sense)</b>	<b>Genetic Advancement 5%</b>	<b>Genetic Advancement as % of Mean 5%</b>
Days to 50% Flowering	<b>13.96</b>	<b>14.04</b>	<b>98.80</b>	<b>18.55</b>	<b>28.58</b>
Days to Maturity	<b>2.94</b>	<b>3.06</b>	<b>92.79</b>	<b>8.29</b>	<b>5.84</b>
Plant Height	<b>15.77</b>	<b>16.55</b>	<b>90.85</b>	<b>34.47</b>	<b>30.97</b>
Flag Leaf Length	<b>5.74</b>	<b>10.87</b>	<b>17.90</b>	<b>2.28</b>	<b>6.25</b>
Number of Fingers per Ear	<b>11.96</b>	<b>14.59</b>	<b>67.19</b>	<b>1.11</b>	<b>20.19</b>
Number of Productive Tillers	<b>7.11</b>	<b>16.62</b>	<b>18.41</b>	<b>0.17</b>	<b>6.26</b>
Flag Leaf Width	<b>10.87</b>	<b>12.14</b>	<b>77.78</b>	<b>0.16</b>	<b>20.03</b>
Finger Length	<b>17.94</b>	<b>18.60</b>	<b>93.01</b>	<b>2.71</b>	<b>35.64</b>
Finger Width	<b>3.26</b>	<b>12.89</b>	<b>7.69</b>	<b>0.01</b>	<b>1.70</b>
Ear Head Length	<b>14.43</b>	<b>15.75</b>	<b>83.98</b>	<b>2.66</b>	<b>27.24</b>
Ear Head Width	<b>6.04</b>	<b>8.32</b>	<b>52.27</b>	<b>0.32</b>	<b>9.02</b>
Number of Ears per Plant	<b>30.37</b>	<b>34.67</b>	<b>76.75</b>	<b>2.70</b>	<b>54.82</b>
Peduncle Length	<b>5.97</b>	<b>12.36</b>	<b>23.32</b>	<b>0.66</b>	<b>5.94</b>
Biological Yield per Plant	<b>9.51</b>	<b>26.84</b>	<b>12.57</b>	<b>2.16</b>	<b>6.95</b>
Harvest Index	<b>33.90</b>	<b>38.31</b>	<b>78.29</b>	<b>20.25</b>	<b>61.78</b>
Test Weight	<b>10.14</b>	<b>11.28</b>	<b>80.56</b>	<b>0.45</b>	<b>18.80</b>
Seed Yield per Plant	<b>25.69</b>	<b>31.69</b>	<b>65.71</b>	<b>3.58</b>	<b>42.90</b>

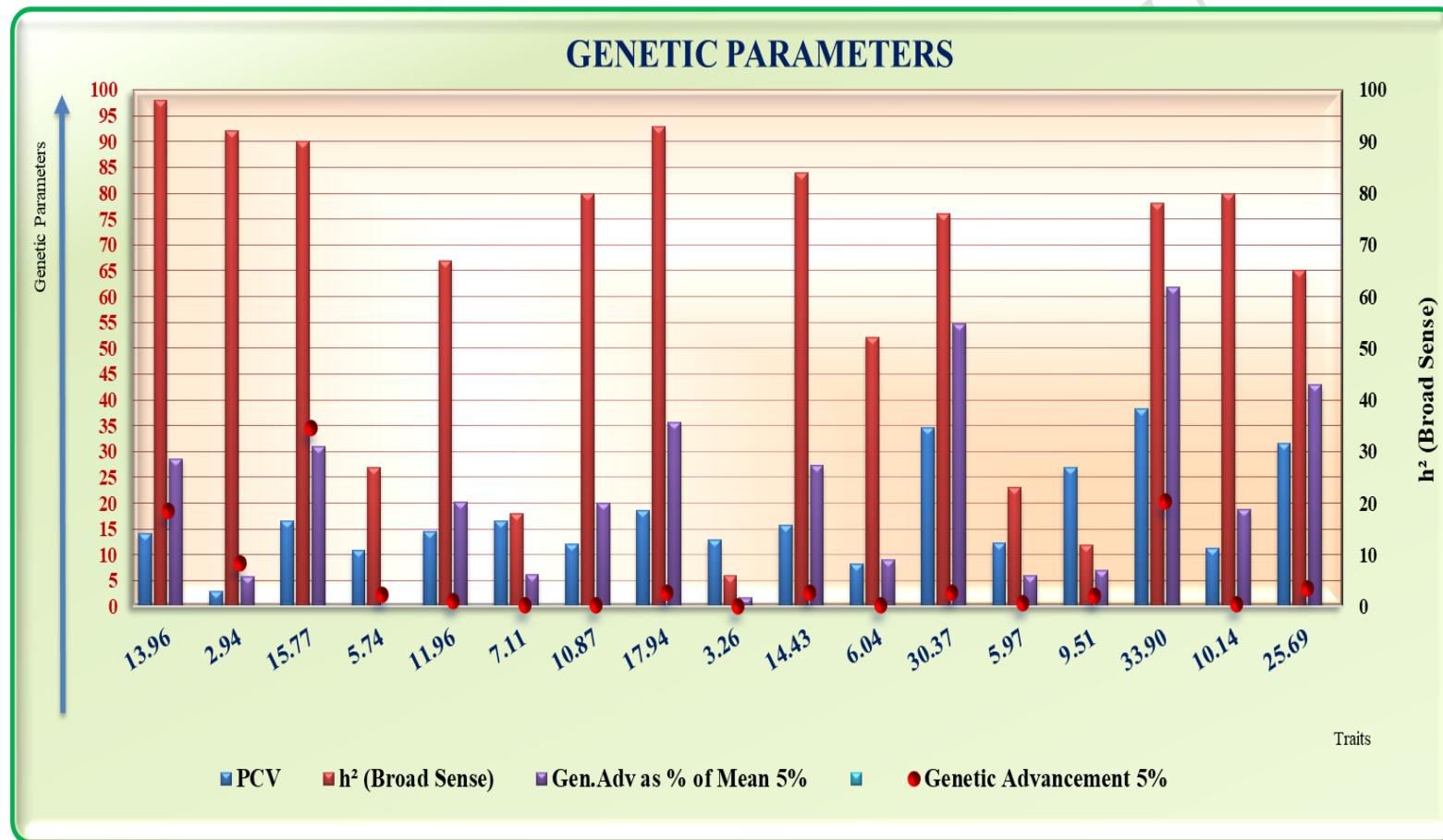


Fig 1. Bar diagram depicting GCV, PCV, heritability and genetic advance for 17 quantitative characters of Finger millet.

**Table 3. Phenotypic correlation coefficient between yield and its components traits in Finger millet**

Traits	DFE	DM	PH	FLL	NFE	NPT	FLW	FL	FW	EHL	EHW	NEP	PL	BYP	HI	TW	SYP
<b>DFE</b>	1	0.3278	<b>0.5398**</b>	0.1775	0.1109	0.0053	0.1906	<b>0.6293*</b>	0.42	<b>0.7105*</b>	<b>0.6037*</b>	<b>-0.524**</b>	-0.2958	0.1543	<b>-0.516**</b>	-0.305	-0.1661
<b>DM</b>		1	<b>0.6586*</b>	<b>0.4616**</b>	0.1719	-0.3493	0.2018	0.2194	-0.0037	0.2927	0.2848	-0.6968*	-0.1391	0.0915	<b>-0.6217*</b>	<b>-0.5092**</b>	-0.4203
<b>PH</b>			1	0.424	<b>0.6048*</b>	0.0647	0.1354	0.2947	<b>0.4761**</b>	0.4514	<b>0.6417*</b>	<b>-0.7237*</b>	-0.1501	0.3937	<b>-0.6701*</b>	-0.2327	-0.1783
<b>FLL</b>				1	0.2117	0.0418	<b>0.5337**</b>	-0.1636	0.0275	-0.0885	0.1157	-0.2809	0.0276	0.2865	<b>-0.6013*</b>	-0.0671	-0.1348
<b>NFE</b>					1	0.1478	0.1993	0.0694	<b>0.4574**</b>	0.1775	<b>0.4892**</b>	-0.3149	0.1757	<b>0.5206**</b>	-0.2058	-0.0825	<b>0.3414**</b>
<b>NPT</b>						1	-0.0291	-0.1535	0.22	-0.1196	-0.0719	0.2719	0.3074	0.4189	-0.0342	0.3003	0.2069
<b>FLW</b>							1	-0.0986	0.2299	-0.0823	0.0383	-0.1077	-0.0409	0.0815	-0.3016	<b>-0.5446**</b>	<b>0.4484*</b>
<b>FL</b>								1	0.3491	<b>0.9547*</b>	<b>0.5352**</b>	<b>-0.5044**</b>	-0.2237	-0.1353	-0.0101	-0.3442	-0.1394
<b>FW</b>									1	0.3433	<b>0.7224*</b>	-0.3064	-0.1953	0.2633	-0.2306	-0.1409	0.1474
<b>EHL</b>										1	<b>0.6198*</b>	<b>-0.5144**</b>	-0.2651	0.0022	-0.0587	-0.3376	-0.0133
<b>EHW</b>											1	<b>-0.4785**</b>	-0.3773	0.2788	-0.2429	-0.2736	0.247
<b>NEP</b>												1	0.1633	0.1797	<b>0.5469*</b>	0.407	<b>0.5786**</b>
<b>PL</b>													1	0.3495	-0.1167	0.3617	0.0145
<b>BYP</b>														1	-0.4177	0.2103	0.468**
<b>HI</b>															1	0.1322	<b>0.5204**</b>
<b>TW</b>																1	0.132
<b>SYP</b>																	1

\*\* 5% Level of Significance  
 \* 1% Level of Significance

**DFE:** Days to 50% Flowering, **DM:** Days to Maturity, **PH:** Plant Height, **FLL:** Flag Leaf Length, **FLW:** Flag Leaf Width, **NFE:** Number of Fingers per Ear, **NPT:** Number of Productive Tillers, **FL:** Finger Length, **FW:** Finger Width, **EHL:** Ear Head Length, **EHW:** Ear Head Width, **NEP:** Number of Ears per Plant, **PL:** Peduncle Length, **BYP:** Biological Yield per Plant, **HI:** Harvest Index, **TW:** Test Weight, **SYP:** Seed Yield per Plant

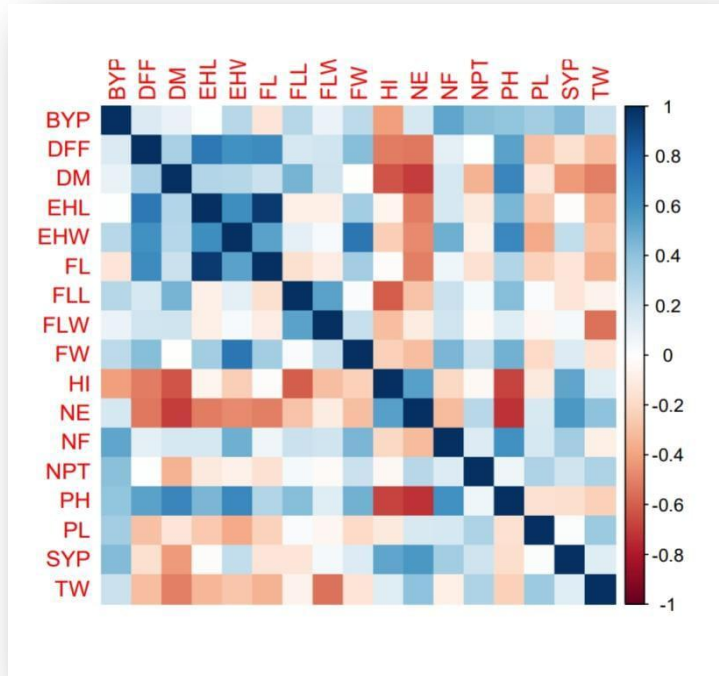
**Table 4. Genotypic correlation coefficient between yield and its components traits in Finger millet**

Traits	DDF	DM	PH	FLL	NFE	NPT	FLW	FL	FW	EHL	EHW	NEP	PL	BYP	HI	TW	SYP
<b>DDF</b>	1	0.3475	<b>0.5882**</b>	-0.3424	0.1534	0.0136	0.2141	<b>0.6544*</b>	-1.7377	<b>0.7719*</b>	<b>0.8169*</b>	<b>-0.5767**</b>	<b>-0.6007*</b>	<b>0.5321**</b>	<b>-0.5809*</b>	-0.3123	-0.188
<b>DM</b>		1	<b>0.6994*</b>	-0.0126	0.2563	<b>-0.8444*</b>	0.2157	0.2353	0.1098	0.3731	0.4182	<b>-0.8644*</b>	<b>-0.4497**</b>	0.0845	<b>-0.7516*</b>	<b>-0.5986*</b>	<b>-0.5805*</b>
<b>PH</b>			1	<b>-0.9476*</b>	<b>0.7169*</b>	0.1002	0.1302	0.3018	<b>-0.5518*</b>	<b>0.5163*</b>	<b>0.8686*</b>	<b>-0.9091*</b>	-0.3465	<b>0.8829*</b>	<b>-0.7643*</b>	-0.3322	-0.2877
<b>FLL</b>				1	-0.2628	0.2678	-0.0081	0.3043	<b>0.6683*</b>	0.2122	-0.0444	0.0934	-0.4139	0.2337	0.378	-0.0885	<b>0.9922*</b>
<b>NF</b>					1	0.2516	0.318	0.1265	<b>-0.9825*</b>	0.2255	<b>0.7519*</b>	<b>-0.4702**</b>	<b>0.8204*</b>	<b>0.8105*</b>	-0.3328	-0.2405	<b>0.472**</b>
<b>NPT</b>						1	-0.2779	-0.3117	0.2705	-0.3229	<b>-0.4999**</b>	<b>0.4473**</b>	<b>0.7079*</b>	0.6072	-0.0913	<b>0.8545*</b>	0.0546
<b>FLW</b>							1	-0.1061	<b>-0.6592*</b>	-0.0894	-0.0289	-0.2419	-0.1082	-0.0416	-0.3996	<b>-0.6841*</b>	-0.0651
<b>FL</b>								1	-0.3914	0.0086	<b>0.7577*</b>	<b>-0.5833*</b>	<b>-0.5483*</b>	-0.4271	0.0596	-0.3993	-0.155
<b>FW</b>									1	<b>-0.6034*</b>	-0.2178	<b>0.5498*</b>	<b>0.768*</b>	-1.5224	<b>0.7461*</b>	<b>0.9536*</b>	<b>0.6593*</b>
<b>EHL</b>										1	<b>0.9823*</b>	<b>-0.5643*</b>	<b>-0.7371*</b>	0.1485	0.0078	-0.3588	0.0598
<b>EHW</b>											1	<b>-0.8256*</b>	-0.0363	0.0862	-0.1675	-0.3499	<b>0.2747**</b>
<b>NE</b>												1	0.4131	-0.4124	<b>0.6202*</b>	<b>0.4629**</b>	<b>0.4862**</b>
<b>PL</b>													1	<b>0.9418*</b>	-0.0785	<b>0.9375*</b>	<b>0.0999</b>
<b>BYP</b>														1	-0.4177	0.2103	<b>0.4688**</b>
<b>HI</b>															1	0.1331	<b>0.601*</b>
<b>TW</b>																1	0.2075
<b>SYP</b>																	1

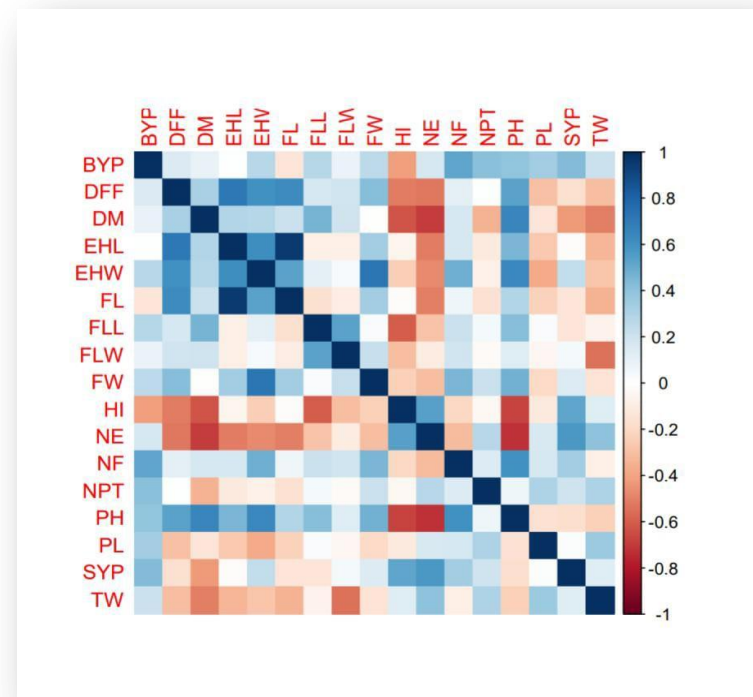
\*\* 5% Level of Significance

\* 1% Level of Significance

**DDF:** Days to 50% Flowering, **DM:** Days to Maturity, **PH:** Plant Height, **FLL:** Flag Leaf Length, **FLW:** Flag Leaf Width, **NFE:** Number of Fingers per Ear, **NPT:** Number of Productive Tillers, **FL:** Finger Length, **FW:** Finger Width, **EHL:** Ear Head Length, **EHW:** Ear Head Width, **NEP:** Number of Ears per Plant, **PL:** Peduncle Length, **BYP:** Biological Yield per Plant, **HI:** Harvest Index, **TW:** Test Weight, **SYP:** Seed Yield per Plant.



**Fig 2. PHENOTYPIC CORRELATION GRAPH**



**Fig 3. GENOTYPIC CORRELATION GRAPH**

**Table 5. Direct and Indirect effects of 17 quantitative characters on seed yield at Phenotypic level**

Traits	DFE	DM	PH	FLL	NFE	NPT	FLW	FL	FW	EHL	EHW	NEP	PL	BYP	HI	TW	SYP
<b>DFE</b>	<b>0.4615</b>	0.1513	0.2491	0.0819	0.0512	0.0024	0.0879	0.2904	0.1938	0.3279	0.2786	-0.2418	-0.1365	0.0712	-0.2381	-0.1407	-0.1661
<b>DM</b>	0.0391	<b>0.1193</b>	0.0786	0.0551	0.0205	-0.0417	0.0241	0.0262	-0.0004	0.0349	0.034	-0.0831	-0.0166	0.0109	-0.0742	-0.0607	-0.4203
<b>PH</b>	0.0891	0.1087	<b>0.1651</b>	0.07	0.0999	0.0107	0.0224	0.0487	0.0786	0.0745	0.1059	-0.1195	-0.0248	0.065	-0.1106	-0.0384	-0.1783
<b>FLL</b>	0.0246	0.0639	0.0587	<b>0.1384</b>	0.0293	0.0058	0.0738	-0.0226	0.0038	-0.0122	0.016	-0.0389	0.0038	0.0396	-0.0832	-0.0093	-0.1348
<b>NFE</b>	0.0016	0.0025	0.0089	0.0031	<b>0.0148</b>	0.0022	0.0029	0.001	0.0067	0.0026	0.0072	-0.0046	0.0026	0.0077	-0.003	-0.0012	<b>0.3414**</b>
<b>NPT</b>	-0.0005	0.0362	-0.0067	-0.0043	-0.0153	<b>-0.1036</b>	0.003	0.0159	-0.0228	0.0124	0.0074	-0.0282	-0.0318	-0.0434	0.0035	-0.0311	0.2069
<b>FLW</b>	0.0303	0.0321	0.0215	0.0849	0.0317	-0.0046	<b>0.159</b>	-0.0157	0.0366	-0.0131	0.0061	-0.0171	-0.0065	0.013	-0.048	-0.0866	<b>0.4484*</b>
<b>FL</b>	-0.1819	-0.0634	-0.0852	0.0473	-0.0201	0.0444	0.0285	<b>-0.2891</b>	-0.1009	-0.276	-0.1547	0.1458	0.0647	0.0391	0.0029	0.0995	-0.1394
<b>FW</b>	-0.0126	0.0001	-0.0143	-0.0008	-0.0137	-0.0066	-0.0069	-0.0105	<b>-0.03</b>	-0.0103	-0.0217	0.0092	0.0059	-0.0079	0.0069	0.0042	0.1474
<b>EHL</b>	-0.109	-0.0449	-0.0692	0.0136	-0.0272	0.0184	0.0126	-0.1464	-0.0527	<b>-0.1534</b>	-0.0951	0.0789	0.0407	-0.0003	0.009	0.0518	-0.0133
<b>EHW</b>	0.2547	0.1202	0.2707	0.0488	0.2064	-0.0304	0.0162	0.2258	0.3048	0.2615	<b>0.4219</b>	-0.2019	-0.1592	0.1176	-0.1025	-0.1154	0.247
<b>NEP</b>	-0.1399	-0.1861	-0.1932	-0.075	-0.0841	0.0726	-0.0288	-0.1347	-0.0818	-0.1373	-0.1278	<b>0.267</b>	0.0436	0.048	0.146	0.1087	<b>0.5786**</b>
<b>PL</b>	-0.0558	-0.0263	-0.0283	0.0052	0.0332	0.058	-0.0077	-0.0422	-0.0369	-0.05	-0.0712	0.0308	<b>0.1887</b>	0.066	-0.022	0.0683	0.0145
<b>BYP</b>	0.081	0.0481	0.2067	0.1504	0.2733	0.2199	0.0428	-0.071	0.1382	0.0012	0.1463	0.0943	0.1835	<b>0.525</b>	-0.2193	0.1104	<b>0.468**</b>
<b>HI</b>	-0.646	-0.7783	-0.8389	-0.7528	-0.2577	-0.0428	-0.3776	-0.0127	-0.2887	-0.0735	-0.3041	0.6847	-0.1461	-0.5229	<b>1.252</b>	0.1655	<b>0.5204**</b>
<b>TW</b>	-0.0022	-0.0037	-0.0017	-0.0005	-0.0006	0.0022	-0.0039	-0.0025	-0.001	-0.0024	-0.002	0.0029	0.0026	0.0015	0.001	<b>0.0072</b>	0.132
<b>SYP</b>	-0.1661	-0.4203	-0.1783	-0.1348	<b>0.3414**</b>	0.2069	<b>0.4484**</b>	-0.1394	0.1474	-0.0133	0.247	<b>0.5786**</b>	0.0145	<b>0.468**</b>	<b>0.5204**</b>	0.132	-0.1661

\*\* 5% Level of Significance

\* 1% Level of Significance

**DFE:** Days to 50% Flowering, **DM:** Days to Maturity, **PH:** Plant Height, **FLL:** Flag Leaf Length, **FLW:** Flag Leaf Width, **NFE:** Number of Fingers per Ear, **NPT:** Number of Productive Tillers, **FL:** Finger Length, **FW:** Finger Width, **EHL:** Ear Head Length, **EHW:** Ear Head Width, **NEP:** Number of Ears per Plant, **PL:** Peduncle Length, **BYP:** Biological Yield per Plant, **HI:** Harvest Index, **TW:** Test Weight, **SYP:** Seed Yield per Plant

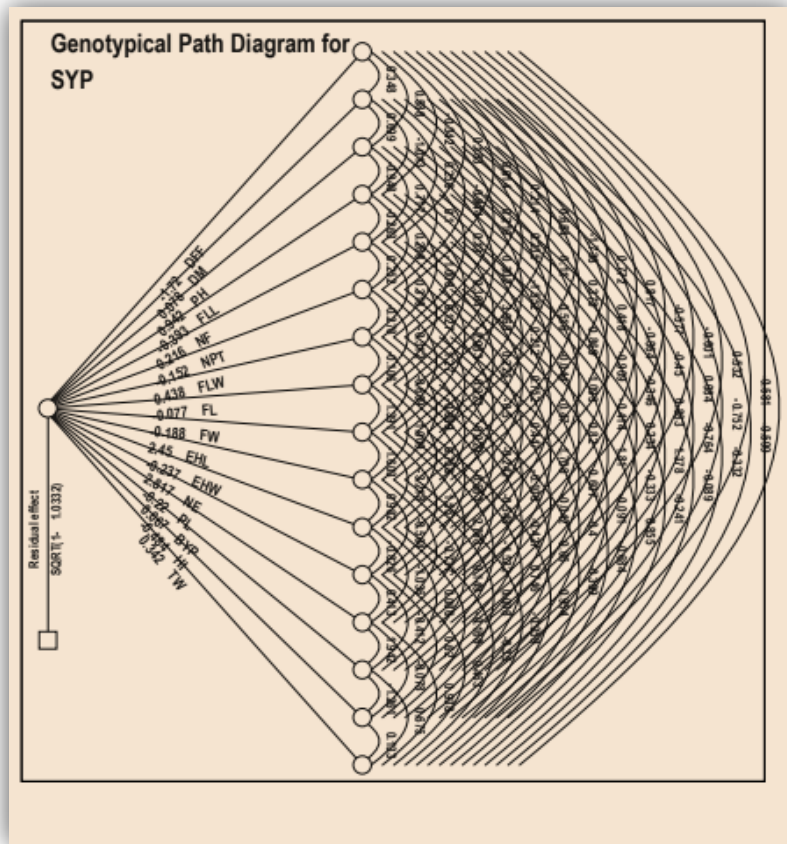
**Table 6. Direct and Indirect effects of 17 quantitative characters on seed yield at Genotypic level**

Traits	DFE	DM	PH	FLL	NF	NPT	FLW	FL	FW	EHL	EHW	NEP	PL	BYP	HI	TW	SYP
<b>DFE</b>	<b>-1.7201</b>	-0.5978	-1.0117	0.589	-0.2638	-0.0235	-0.3683	-1.1256	2.9889	-1.3277	-1.4051	0.9919	1.0333	-0.9153	0.9992	0.5372	-0.188
<b>DM</b>	0.0271	<b>0.0781</b>	0.0546	-0.0791	0.02	-0.066	0.0168	0.0184	0.0086	0.0291	0.0327	-0.0675	-0.0351	0.0066	-0.0587	-0.0468	<b>-0.5805*</b>
<b>PH</b>	0.5538	0.6585	<b>0.9416</b>	-0.8923	0.6751	0.0944	0.1226	0.2842	-1.4612	0.4861	0.8179	-0.856	-0.3263	0.8314	-0.7197	-0.3128	-0.2877
<b>FLL</b>	0.1347	0.3983	0.3727	<b>-0.3933</b>	0.1034	-0.1053	0.3965	-0.1197	-1.4429	-0.0835	0.0174	-0.4301	0.1628	-0.0919	-0.542	0.0348	<b>0.9922*</b>
<b>NFE</b>	0.0331	0.0554	0.1549	-0.0568	<b>0.2161</b>	0.0544	0.0687	0.0273	-0.6445	0.0487	0.1625	-0.1016	0.1773	0.3912	-0.0719	-0.052	<b>0.472**</b>
<b>NPT</b>	-0.0021	0.1279	-0.0152	-0.0406	-0.0381	<b>-0.1515</b>	0.0421	0.0472	-0.1925	0.0489	0.0757	-0.0678	-0.2588	-0.092	0.0138	-0.1295	0.0546
<b>FLW</b>	0.0938	0.0944	0.057	-0.4414	0.1392	-0.1217	<b>0.4378</b>	-0.0464	-0.2886	-0.0392	-0.0127	-0.1059	-0.0474	-0.0182	-0.175	-0.2995	-0.0651
<b>FL</b>	-0.0503	-0.0181	-0.0232	-0.0234	-0.0097	0.0239	0.0081	<b>-0.0768</b>	0.1069	-0.0775	-0.0582	0.0448	0.0421	0.0328	-0.0046	0.0307	-0.155
<b>FW</b>	0.3269	-0.0207	0.2919	-0.6901	0.5611	-0.239	0.124	0.2617	<b>-0.1881</b>	0.3016	0.6053	-0.2915	-0.5207	0.2864	-0.1403	-0.1794	<b>0.6593*</b>
<b>EHL</b>	1.8908	0.9138	1.2647	0.5199	0.5523	-0.791	-0.2191	2.4707	-3.9278	<b>2.4496</b>	2.4063	-1.3824	-1.8055	0.3638	0.019	-0.8788	0.0598
<b>EHW</b>	-0.1936	-0.0991	-0.2058	0.0105	-0.1782	0.1184	0.0068	-0.1795	0.7625	-0.2328	<b>-0.237</b>	0.1956	0.2456	-0.0204	0.0397	0.0829	<b>0.2747**</b>
<b>NE</b>	-1.6244	-2.4348	-2.5607	3.0797	-1.3246	1.2601	-0.6814	-1.6431	4.3656	-1.5896	-2.3255	<b>2.8168</b>	1.1637	-1.1617	1.7469	1.3039	<b>0.4862**</b>
<b>PL</b>	0.1323	0.0991	0.0763	0.0912	-0.1807	-0.3762	0.0238	0.1208	-0.6097	0.1624	0.2283	-0.091	<b>-0.2203</b>	-0.4277	0.0173	-0.2065	0.0999
<b>BYP</b>	0.0357	0.0057	0.0592	0.0157	0.1214	0.0407	-0.0028	-0.0286	-0.1021	0.01	0.0058	-0.0276	0.1302	<b>0.067</b>	-0.0846	0.0452	<b>0.4688**</b>
<b>HI</b>	0.281	0.3636	0.3698	-0.6666	0.161	0.0442	0.1933	-0.0288	-0.3609	-0.0038	0.081	-0.3	0.038	0.6103	<b>-0.4838</b>	-0.0644	<b>0.601*</b>
<b>TW</b>	-0.1069	-0.205	-0.1138	-0.0303	-0.0824	0.2926	-0.2342	-0.1367	0.3265	-0.1228	-0.1198	0.1585	0.321	0.231	0.0456	<b>0.3424</b>	0.2075
<b>SYP</b>	-0.188	<b>-0.5805*</b>	-0.2877	<b>0.9922*</b>	<b>0.472**</b>	0.0546	-0.0651	-0.155	<b>0.6593*</b>	0.0598	<b>0.2747**</b>	<b>0.4862**</b>	0.0999	<b>0.4688**</b>	<b>0.601*</b>	0.2075	1

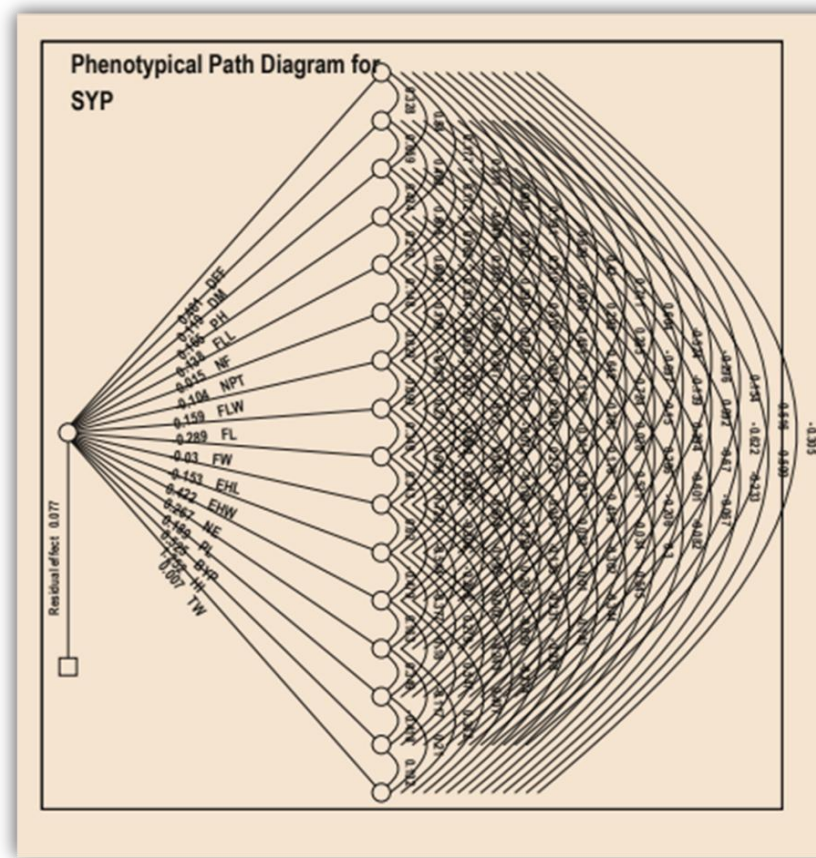
\*\* 5% Level of Significance

\* 1% Level of Significance

**DFE:** Days to 50% Flowering, **DM:** Days to Maturity, **PH:** Plant Height, **FLL:** Flag Leaf Length, **FLW:** Flag Leaf Width, **NFE:** Number of Fingers per Ear, **NPT:** Number of Productive Tillers, **FL:** Finger Length, **FW:** Finger Width, **EHL:** Ear Head Length, **EHW:** Ear Head Width, **NEP:** Number of Ears per Plant, **PL:** Peduncle Length, **BYP:** Biological Yield per Plant, **HI:** Harvest Index, **TW:** Test Weight, **SYP:** Seed Yield per Plant.



**Fig 4 GENOTYPIC PATH DIAGRAM**



**Fig 5. PHENOTYPIC PATH**

## CONCLUSION

Based on the work in 18 Genotypes of Finger millet on 17 quantitative characters, it is concluded that all the studied genotypes have shown significant difference. The genotype, **IE 175** has shown the highest mean performance for seed yield per plant. Whereas, genotypic and phenotypic coefficient of variation were found high for number of ears per plant and harvest index. high heritability coupled with high genetic advance as percent of mean was observed for days to 50% flowering, plant height, finger length, ear head length, test weight. Correlation coefficient revealed that seed yield per plant exhibited significant and positive correlations with number of fingers per ear, number of ears per plant, biological yield per plant, harvest index at both genotypic and phenotypic levels. Path Coefficient Analysis has revealed that number of fingers per ear, number of ears per plant, biological yield per plant, harvest index positive and direct effect on seed yield per plant at both genotypic and phenotypic levels. Hence the selection of genotypes based on the above-mentioned characters will be useful for crop improvement in Finger millet.

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