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# Study of Genetic Variability and Character Association in Elite Lines of Finger Millet [*Eleusine coracana* (L.)] Suitable for Eastern Plain Zone of Uttar Pradesh

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

The present study was entitled "Study of genetic variability and character association in elite lines of finger millet [*Eleusine coracana* (L.)] Suitable for the eastern plain zone of Uttar Pradesh" was carried out to estimate the genetic variability, genetic advance, correlation, between yield and yield

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contributing traits and direct and indirect effect of yield component on yield through path analysis (18). The present investigation concluded genotype acquiring the less for grain yield per plant were IC NO 0474166 (FIN NO 5126) (0.41 t/ha). The genotype IC NO 0473932 (FIN NO 4980) (2.22 t/ha) was high ear head length. This genotype was the highest grain yield per plant than CHECK GPU 67 (0.55 t/ha). The genotype IC NO 0473932 (FIN NO 4980) (2.22 t/ha) was 1.67 t/ha higher yield than CHECK GPU 67 (0.55 t/ha). The highest genotypic variance observed were finger length, harvest index, grain yield per plant. The highest phenotypic coefficient of variance observed were test weight, finger length, harvest index, grain yield per plant. The highest heritability were recorded in harvest index, grain yield per plant, flag leaf width, plant height, Number of days to 50% flowering, Days to Maturity, finger width, finger length. The traits Number of days to 50% flowering, biological yield per plant, plant height, days to Maturity exhibited moderate genetic advance. The traits were biological yield per plant, test weight, finger width, harvest index, finger length, grain yield per plant recorded high genetic advance as percentage of mean. Genotypic correlation coefficient reveals that single plant yield significantly positive correlation with number of finger fingers per, harvest index, biological yield per plant, finger length, ear head length, finger width, no. of tillers per plant, flag leaf length. For phenotypic correlation traits were harvest index, test weight, biological yield per plant, number of finger per ear, ear head length, flag leaf length, number of tillers per plant, flag leaf width showed significantly positive correlation with grain yield per plant. The traits harvest index, flag leaf length, flag leaf width, number of finger per ear showed higher positive direct effect on grain yield per plant at genotypic level. The traits harvest index, biological yield, plant height showed higher positive direct effect on grain yield per plant at phenotypic level (6).

*Keywords: Finger millet; genetic variability; heritability; genetic advance; genotypic correlation; phenotypic correlation; path analysis.*

## 1. INTRODUCTION

"Finger millet originated and was domesticated in Africa. Archaeological and linguistic evidences show that around 5,000 years ago, farming communities in eastern Africa were already cultivating this millet. The exact area of domestication is unknown, and it has been suggested that it may have occurred anywhere between western Uganda and the Ethiopian highlands of Eastern Africa" [1]. "From Africa the crop was transported to India about 3,000 years ago, whereupon the subcontinent became its secondary center of diversity. Cultivated finger millet (*Eleusine coracana subsp. coracana*) is likely to have been derived from selection and domestication of a large-grained mutant of the wild E. *coracana* subsp. *Africana"* [2,3].

"In India, finger millet occupies the largest area under cultivation among the small millets. Finger millet stands unique among the cereals such as barley, rye and oats with higher nutritional contents and has outstanding properties as a subsistence food crop. It is rich in calcium (0.34%), dietary fiber (18%), phytates (0.48%), protein (6%–13%) minerals (2.5%–3.5%), and phenolics (0.3%–3%)" [4].

"Finger millet occupies an area of 6.93 million ha with an average production of 8.61 million tones and productivity of 1243 kg/ha during 2020 – 2021 (Directorate of Millets Development, 2021; Project Coordinator Review, 2021). In Uttar Pradesh finger millet occupies 183 million ha area, 195.23 million tonnes production, 1000 kg/ha productivity" [5].

The existence of genetic variability is the pre-requisite for any crop improvement programme. Yield is a complex quantitative trait which, cannot be improved by selecting individuals on performance basis. Thus, it can be improved by practicing selection for other traits which are highly heritable and are interrelated with the yield as well [6,7].

The knowledge of nature and magnitude of correlation for characters of economic importance and cause and effects of relationship of yield and yield components for the available genotypes are of utmost essential which, helps in planning the future breeding programme for genetic improvement for yield potential of any crop species.

## 2. MATERIALS AND METHODS

The present investigation was carried out in the Field Experimentation Centre of the Department of Genetics and Plant Breeding, Naini

Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P during Kharif-2021. A randomized block design was adopted with three replications and spacing of 20 x 10 cm with a plot size of 1x 1 sq.m. Replication-wise data on the basis of five randomly taken competitive plants from each replication were recorded on the following quantitative traits:Plant height (cm), test weight (g), number of productive tillers per plant,ear head length (cm), number of finger per ear, finger length (cm), finger width (cm), flag leaf length (cm), flag leaf width (cm),days to 50 per cent flowering, days to maturity,biological yield per plant (g) and hharvest index. Data obtained from all the characteristics were subjected to analysis the variance with the formula suggested by (25). Further, different components of variance i.e., As per established methods, data were statistically analyzed to determine the genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV), heritability, genetic advance and genetic advance as a percent mean. For the analysis of variance, genotypic coefficient of variation and phenotypic coefficient of variation, standard statistical methods were utilised heritability and genetic advanced [8,9]. used genotypic and phenotypic variances and co-variances to calculate genotypic and phenotypic correlation coefficients. The path coefficient study was carried out using the technique proposed by Devaliya [10].

## 2.1 Layout Description

**Chart 1. Experimental material**

| | |
|---|---|
| **Season** | : *Kharif*, 2021 |
| **Crop** | : Finger millet [*Eleusine coracana* (L.)] |
| **Experimental design** | : Randomized Block Design |
| **Number of genotypes** | : 20 |
| **Number of replications** | : 3 |
| **Net cultivated area** | : 60m² |
| **Spacing** | : 20X10 cm |
| **Date of sowing** | : 05-08- 2021 |
| **Fertilizer dose** | : NPK@120:60:60 |

*Source: The experimental material for present study will be obtained from Indian Institute of Millets Research (Hyderabad)*

## 3. RESULTS AND DISCUSSION

For all of the traits studied, the analysis of variance indicated substantial differences between the genotypes (Table 1). As a result, it revealed a significant level of genetic heterogeneity among twenty finger millet genotypes. Evaluation of genetic characteristics, correlation and path coefficient analysis aid in the examination of significant traits during the selection process for optimizing Finger millet productivity. (Table 2) displays the genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability, genetic advance (GA) and genetic advance as a percent of mean GA (percent) for all yield contributing characteristics.

For all of the characters, PCV was higher than the matching GCV, indicating that the environment had an impact [11]. The highest PCV and GCV were found for Grain yield per plant (57.63 and 49.58), harvest index (40.70 and 35.14), finger length (29.29 and 29.29), test weight (23.44 and 17.36), biological yield per plant (20.07 and 14.57) similar results were reported [12-14]. The genotypic coefficient of variation estimations reflects the overall amount of genotypic variability present in the material [15,16].

Heritability, on the other hand, reflects the fraction of this genotypic polymorphism that is passed down from parents to offspring [17]. Proposed the broad sense heredity idea. It influences how effective genotypic variability may be used in a breeding programme. Table 2 shows the heritability estimates obtained during the current investigation. The heritability of the qualities is moderate to high, ranged from 1.70% (flag leaf length) to 100% (finger length). harvest index (61.80%), grain yield per plant (74%), flag leaf width (80.50%), plant height (81.20%), Number of days to 50% flowering (92.50%), Days to Maturity 97.20%), finger width (97.20%), finger length (100%) The high heritability values of the qualities examined in this study revealed that they were less influenced by the environment, allowing for successful selection of traits based on phenotypic appearance using a simple selection strategy and indicating the possibility of genetic progress. Similar findings were reported by Mahanthesha [18].

High genetic advance was recorded for days to Maturity (18.57), plant height (17.77), biological yield per plant (15.89), highest yield (2.22 ta/ha) Number of days to 50% flowering (12.06%) [19]. Similar findings were reported by Madhavilatha, Annamalai [20,21].

High genetic advance as percent mean was recorded for grain yield per plant (87.87), finger length (60.33), harvest index (56.91), finger width (36.03), Test weight (26.47), biological yield per

plant (21.79). Similar findings were reported by Reddy [22].

During the correlation study, associations between yield and yield contributing features were investigated under study [23,24]. Table 3 shows the phenotypic and genotypic correlation coefficients between the investigated features of 20 finger millet genotypes on different quantitative traits. “In most cases, the genotypic correlation was higher than that of phenotypic correlation; revealing that the association may be largely due to genetic reason (strong coupling linkage)” [25]. Number of finger per ear (0.9283* and 0.3973**), harvest index (0.8904* and 0.88435*), biological yield per plant (0.8637** and 0.6044*), finger length (0.6471* and 0.5567), ear head length (0.5188** and 0.34488**), finger width (0.3471* and 0.0597*), no. of tillers per plant (0.2816** and 0.2002*), flag leaf length (0.2201* and 0.2445**) [22,26]. The traits are significantly correlated with grain yield per plant through genotypic as well as phenotypic correlation [27,28]. Similar findings were reported by Ganapathy [29]**.**

Path analysis is one of the most accurate statistical techniques for determining the interdependence of features and the degree of control of independent characters on seed production [28]**.**When it comes to choosing high-yielding germplasm, the idea of direct and indirect influence of yield contributing traits on the final end product yield in any crop is crucial [30]. Table 4 depicted the direct and indirect effects of 12 traits on grain yield per plant In genotypic path analysis revealed that number of finger per ear (0.9283*), harvest index (0.8904*). Biological yield per plant (0.8637**), finger length (0.6471*), ear head length (0.5188**), finger width (0.3471*), No. of tillers per plant (0.2816**), flag leaf length (0.2201*) are direct effect on grain yield per plant. Similar findings were reported by Devaliya, Nandini [10,19].

**Table 1. Analysis of variance for 14 biometrical traits of finger millet**

| Characters | Replication | Genotypes | Error |
|---|---|---|---|
| Degrees of freedom | (df=02) | (df=19) | (df=38) |
| Number of days to 50% flowering | 2.22 | 119.94** | 5.03 |
| Days to Maturity | 12.35 | 258.09** | 4.35 |
| Plant height | 29.69 | 338.51** | 1.19 |
| No. Of tillers per plant | 1.82 | 1.96** | 0.83 |
| Flag leaf length | 73.3 | 17.49** | 1.26 |
| Flag leaf width | 0.1 | 0.02** | 0.06 |
| Finger length | 1.26 | 4.49** | 1.79 |
| Finger width | 0.1 | 0.13** | 4.11 |
| Number of finger per ear | 6.51 | 3.97** | 2.96 |
| Ear head length | 0.65 | 3.94** | 1.65 |
| Biological yield per plant | 575.45 | 641.72** | 3.86 |
| Test weight | 0.94 | 0.67** | 0.3 |
| Harvest index | 52.86 | 112.09** | 4.89 |
| Grain yield per plant | 11.26 | 94.56** | 4.74 |

*Level of significance at 5 %, ** Level of significance at 1%*

**Table 2. Genetic parameters for 14 quantitative characters of finger millet genotypes**

| Characters | GCV | PCV | h² (broad sense) | Genetic advance | Genetic advance as % of mean |
|---|---|---|---|---|---|
| Number of days to 50% flowering | 9.20 | 9.56 | 92.50 | 12.06 | 18.23 |
| Days to Maturity | 8.95 | 9.08 | 97.20 | 18.57 | 18.18 |
| plant height | 10.86 | 12.05 | 81.20 | 17.77 | 20.16 |
| No. of tillers per plant | 7.31 | 20.35 | 12.90 | 0.15 | 5.41 |
| flag leaf length | 0.80 | 6.23 | 1.70 | 0.08 | 0.21 |
| flag leaf width | 8.03 | 8.95 | 80.50 | 0.15 | 14.84 |
| finger length | 29.29 | 29.29 | 100.00 | 4.64 | 60.33 |
| finger width | 17.74 | 18.00 | 97.20 | 0.42 | 36.03 |
| number of finger per ear | 6.47 | 12.84 | 25.40 | 0.60 | 6.72 |
| ear head length | 8.59 | 11.25 | 58.20 | 1.38 | 13.50 |
| biological yield per plant | 14.57 | 20.07 | 52.70 | 15.89 | 21.79 |
| Test weight | 17.36 | 23.44 | 54.80 | 0.54 | 26.47 |
| harvest index | 35.14 | 44.70 | 61.80 | 7.78 | 56.91 |
| grain yield per plant | 49.58 | 57.63 | 74.00 | 8.56 | 87.87 |

*PCV: Phenotypic Coefficient of Variation, GCV: Genotypic Coefficient of Variation, $h^2$bs: heritability (broad sense), GA: Genetic Advance, GAM: Genetic Advance as Percent of Mean*

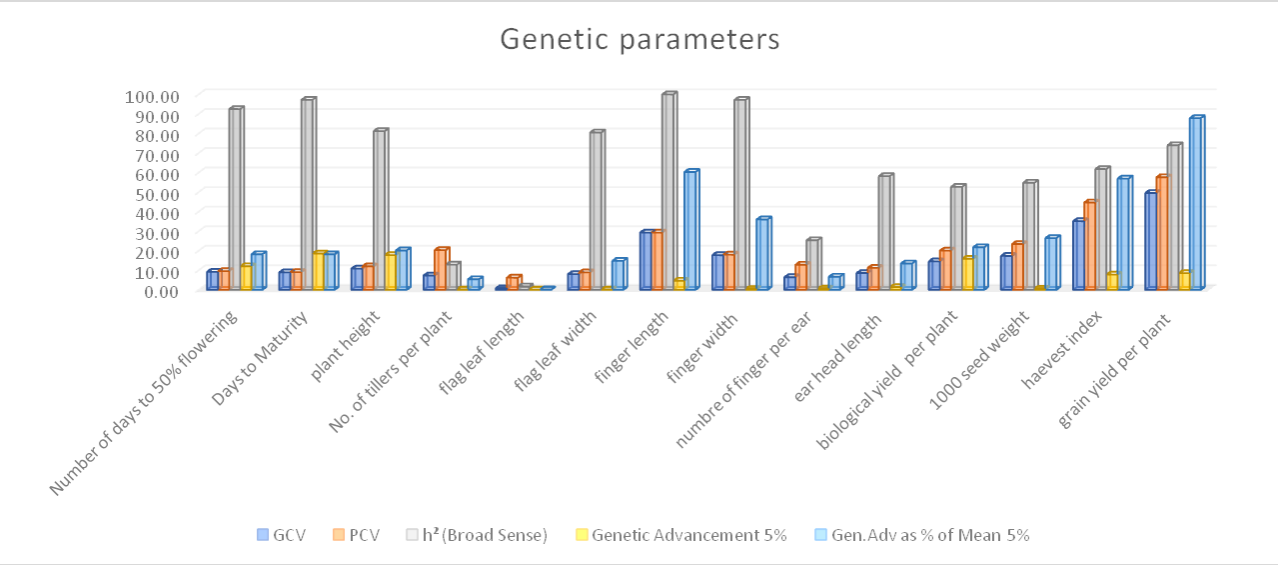


**Fig. 1. Histogram depicting gcv, pcv, heritability and genetic advance for 16 quantitative characters of 20 finger millet genotypes**

**Table 3. Genotypic and phenotypic correlation among the different traits evaluated in finger millet during Kharif-2021**

| Traits | | Number of days to 50% flowering | Days to Maturity | plant height (cm) | No. of tillers per plant | flag leaf length | flag leaf width | finger length | finger width | number of finger per ear | ear head length | biological yield per plant | Test weight | harvest index | Grain yield per plant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of days to 50% flowering** | G | 1 | 0.8091** | 0.2278 | -0.2938* | -0.8939** | -0.0226 | 0.2737* | 0.3082 | -0.2346* | 0.6076 | 0.1536** | -0.0561 | -0.455* | -0.1755 |
| | P | | 0.7613* | 0.2091** | -0.0665 | -0.127* | -0.012 | 0.2633* | 0.2839** | -0.163 | 0.4612 | 0.1071* | -0.0459 | -0.3199 | -0.1468 |
| **Days to Maturity** | G | | 1 | 0.3804* | 0.0997** | -0.9362* | -0.1891 | 0.2981 | 0.1882* | 0.4061 | 0.4651** | 0.1091 | -0.1378* | -0.4547 | -0.2731 |
| | P | | 1 | 0.3341* | 0.0485 | -0.1092 | -0.1657 | 0.2939 | 0.182 | 0.2077 | 0.3513 | 0.0735 | -0.0846* | -0.3157 | -0.1958 |
| **plant height(cm)** | G | | | 1 | 0.4025* | - 0.5863** | 0.3903 | 0.2231 | 0.2237** | 0.1472 | -0.056 | 0.221* | -0.023 | -0.4071* | 0.0986 |
| | P | | | 1 | 0.0855 | -0.2858* | 0.3429 | 0.2011 | 0.2116* | 0.1828 | 0.0154 | 0.2629* | 0.0927 | -0.2668** | -0.456* |
| **No. of tillers per plant** | G | | | | 1 | 0.9902 | 0.0523** | -0.6912 | 0.9452* | 0.3551 | -0.621* | 0.3131 | 0.4672** | -0.0253 | 0.2816** |
| | P | | | | 1 | 0.4869* | 0.027** | -0.2483* | 0.3059* | 0.314 | -0.1729* | 0.2788 | 0.4076* | 0.1466 | 0.2002* |

| Traits | | Number of days to 50% flowering | Days to Maturity | plant height (cm) | No. of tillers per plant | flag leaf length | flag leaf width | finger length | finger width | number of finger per ear | ear head length | biological yield per plant | Test weight | harvest index | Grain yield per plant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **flag leaf length** | G | | | | | 1 | 0.2013 | -0.0283** | 0.9159 | -0.1068 | -0.2463* | -0.8569* | 0.6572* | 0.4171 | 0.2201* |
| | P | | | | | 1 | 0.1354 | -0.2606 | 0.159** | 0.0026 | 0.0691 | -0.1301* | 0.2601* | 0.3623 | 0.2445** |
| **flag leaf width** | G | | | | | | 1 | 0.4003 | 0.2756* | -0.3788 | 0.2127 | -0.1546 | 0.3776 | -0.0801* | -0.0746 |
| | P | | | | | | 1 | 0.359 | 0.2441* | -0.1294 | 0.2426 | -0.0861* | 0.1802 | -0.0658** | 0.0597* |
| **finger length** | G | | | | | | | 1 | -0.0859* | -0.2867 | 0.7764* | -0.4653 | -0.1735 | -0.7104* | 0.6471* |
| | P | | | | | | | 1 | -0.0847 | -0.1445 | 0.5925 | -0.3379* | -0.1285 | -0.5585* | 0.5567 |
| **finger width** | G | | | | | | | | 1 | -0.4173* | 0.1084 | -0.2075 | 0.0939* | -0.3947 | 0.3471* |
| | P | | | | | | | | 1 | -0.2012 | 0.0695* | -0.1617 | 0.0914 | -0.2998* | 0.2965 |
| **number of finger per ear** | G | | | | | | | | | 1 | -0.1943 | 1.2974* | 0.3733* | 0.5574 | 0.9283* |
| | P | | | | | | | | | 1 | -0.088* | 0.5559 | 0.1909 | 0.1559* | 0.3973** |
| **ear head length** | G | | | | | | | | | | 1 | -0.3892 | -0.3725* | -0.5813 | **0.5188 |
| | P | | | | | | | | | | 1 | -0.1498 | -0.208* | -0.3932 | 0.3488** |
| **biological yield per plant** | G | | | | | | | | | | | 1 | 0.371 | 0.5168* | 0.8637** |
| | P | | | | | | | | | | | 1 | 0.3107 | 0.1753* | 0.6044** |
| **Test weight** | G | | | | | | | | | | | | 1 | 0.7886* | 0.961 |
| | P | | | | | | | | | | | | 1 | 0.1753* | 0.6044** |
| **harvest index** | G | | | | | | | | | | | | | 1 | 0.8904* |
| | P | | | | | | | | | | | | | 1 | 0.8435* |

**Table 4. Direct (bold) and indirect effect at genotypic and phenotypic level for different quantitative traits on seed yield**

| Traits | | Number of days to 50% flowering | Days to Maturity | plant height (cm) | No. of tillers per plant | flag leaf length | flag leaf width | finger length | finger width | number of finger per ear | ear head length | biological yield per plant | 1000 seed weight | harvest index | grain yield per plant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of days to 50% flowering** | G | -0.5947 | -0.4812 | -0.1355 | 0.1747 | 0.5316 | 0.0135 | -0.1628 | -0.1833 | 0.1395 | -0.3613 | -0.0913 | 0.0333 | 0.2706 | -0.1755 |
| | P | 0.2335 | 0.1778 | 0.0488 | -0.0155 | -0.0297 | -0.0028 | 0.0615 | 0.0663 | -0.0381 | 0.1077 | 0.025 | -0.0107 | -0.0747 | -0.1468 |
| **Days to Maturity** | G | 0.6616 | 0.8177 | 0.311 | 0.0815 | -0.7655 | -0.1546 | 0.2438 | 0.1539 | 0.332 | 0.3803 | 0.0892 | -0.1127 | -0.3718 | -0.2731 |
| | P | -0.157 | -0.2063 | -0.0689 | -0.01 | 0.0225 | 0.0342 | -0.0606 | -0.0375 | -0.0429 | -0.0725 | -0.0152 | 0.0175 | 0.0651 | -0.1958 |
| **plant height (cm)** | G | -0.1922 | -0.3209 | -0.8436 | -0.3396 | 3.0253 | -0.3292 | -0.1882 | -0.1887 | -0.1242 | 0.0473 | -0.1865 | 0.0194 | 0.3434 | 0.0986 |
| | P | 0.0257 | 0.0411 | 0.123 | 0.0105 | -0.0352 | 0.0422 | 0.0247 | 0.026 | 0.0225 | 0.0019 | 0.0323 | 0.0114 | -0.0328 | -0.0211 |

| Traits | | Number of days to 50% flowering | Days to Maturity | plant height (cm) | No. of tillers per plant | flag leaf length | flag leaf width | finger length | finger width | number of finger per ear | ear head length | biological yield per plant | 1000 seed weight | harvest index | grain yield per plant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No. of tillers per plant** | G | 0.1243 | -0.0422 | -0.1703 | -0.4231 | -3.8033 | -0.0221 | 0.2924 | -0.3999 | -0.9963 | 0.2627 | -0.5555 | -0.6207 | 0.0107 | 0.2816** |
| | P | 0.0116 | -0.0085 | -0.0149 | -0.1748 | -0.0851 | -0.0047 | 0.0434 | -0.0535 | -0.0549 | 0.0302 | -0.0487 | -0.0712 | -0.0256 | 0.2002 |
| **flag leaf length** | G | 0.1252 | 0.1311 | 0.5022 | -1.2589 | -0.14 | -0.1682 | 0.284 | -0.1282 | 0.155 | 0.0345 | 0.26 | -0.232 | -0.4785 | 0.2201* |
| | P | -0.0176 | -0.0151 | -0.0396 | 0.0674 | 0.1385 | 0.0187 | -0.0361 | 0.022 | 0.0004 | 0.0096 | -0.018 | 0.036 | 0.0502 | 0.2445 |
| **flag leaf width** | G | -0.0065 | -0.0547 | 0.1128 | 0.0151 | 0.3473 | 0.2891 | 0.1157 | 0.0797 | -0.1095 | 0.0615 | -0.0447 | 0.1092 | -0.0232 | -0.0746 |
| | P | 0.0006 | 0.0076 | -0.0157 | -0.0012 | -0.0062 | -0.0458 | -0.0165 | -0.0112 | 0.0059 | -0.0111 | 0.0039 | -0.0083 | 0.003 | -0.0597 |
| **finger length** | G | 0.3351 | 0.365 | 0.2732 | -0.8462 | -2.4833 | 0.4901 | 1.2244 | -0.1052 | -0.351 | 0.9506 | -0.5697 | -0.2124 | -0.8698 | 0.6471* |
| | P | -0.0287 | -0.032 | -0.0219 | 0.027 | 0.0284 | -0.0391 | -0.1089 | 0.0092 | 0.0157 | -0.0645 | 0.0368 | 0.014 | 0.0608 | -0.5567 |
| **finger width** | G | 0.475 | 0.2901 | 0.3447 | 1.4567 | 1.4115 | 0.4247 | -0.1324 | 1.5411 | -0.6432 | 0.1671 | -0.3198 | 0.1448 | -0.6084 | 0.3471* |
| | P | -0.0272 | -0.0174 | -0.0203 | -0.0293 | -0.0152 | -0.0234 | 0.0081 | -0.0958 | 0.0193 | -0.0067 | 0.0155 | -0.0088 | 0.0287 | -0.2965 |
| **number of finger per ear** | G | -0.0188 | 0.0326 | 0.0118 | 0.1889 | -0.0888 | -0.0304 | -0.023 | -0.0335 | 0.0802 | -0.0156 | 0.1041 | 0.0299 | 0.0447 | 0.9283* |
| | P | -0.027 | 0.0344 | 0.0302 | 0.0519 | 0.0004 | -0.0214 | -0.0239 | -0.0333 | 0.1654 | -0.0145 | 0.0919 | 0.0316 | 0.0258 | 0.3973 |
| **ear head length** | G | -0.3911 | -0.2994 | 0.0361 | 0.3997 | 0.1585 | -0.1369 | -0.4997 | -0.0698 | 0.1251 | -0.6437 | 0.2505 | 0.2398 | 0.3741 | **0.5188 |
| | P | -0.0067 | -0.0051 | -0.0002 | 0.0025 | -0.001 | -0.0035 | -0.0086 | -0.001 | 0.0013 | -0.0145 | 0.0022 | 0.003 | 0.0057 | -0.3488 |
| **biological yield per plant** | G | 0.1631 | 0.1159 | 0.2348 | 1.3947 | -1.9723 | -0.1642 | -0.4942 | -0.2204 | 1.378 | -0.4134 | 1.0621 | 0.394 | 0.5489 | 0.8637** |
| | P | 0.0322 | 0.0221 | 0.0791 | 0.0839 | -0.0392 | -0.0259 | -0.1017 | -0.0487 | 0.1673 | -0.0451 | 0.3009 | 0.0935 | 0.0528 | 0.6044 |
| **1000 seed weight** | G | 0.0196 | 0.0482 | 0.008 | -0.5134 | -0.5799 | -0.1321 | 0.0607 | -0.0329 | -0.1306 | 0.1303 | -0.1298 | -0.3499 | -0.2759 | 0.961 |
| | P | -0.0121 | -0.0224 | 0.0245 | 0.1079 | 0.0688 | 0.0477 | -0.034 | 0.0242 | 0.0505 | -0.0551 | 0.0822 | 0.2647 | 0.1399 | 0.6605 |
| **harvest index** | G | -0.8761 | -0.8754 | -0.7839 | -0.0487 | 6.5791 | -0.1542 | -1.3677 | -0.76 | 1.0733 | -1.1191 | 0.995 | 1.5184 | 1.9254 | 0.8904* |
| | P | -0.1742 | -0.172 | -0.1453 | 0.0798 | 0.1974 | -0.0358 | -0.3042 | -0.1633 | 0.0849 | -0.2141 | 0.0955 | 0.2878 | 0.5447 | 0.8435 |

*G*: genotypic path analysis, P*: phenotypic path analysis*

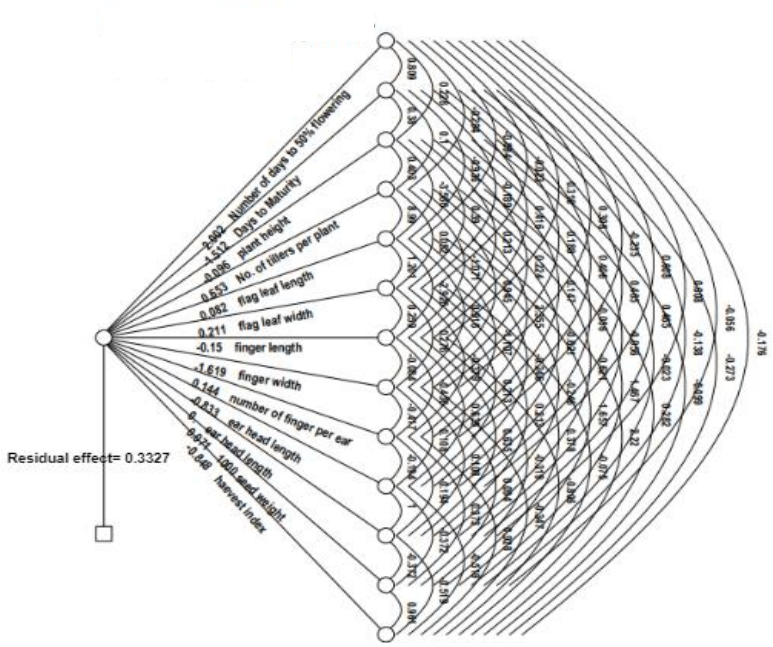


**Fig. 2. Genotypic path diagram for grain yield per plant**

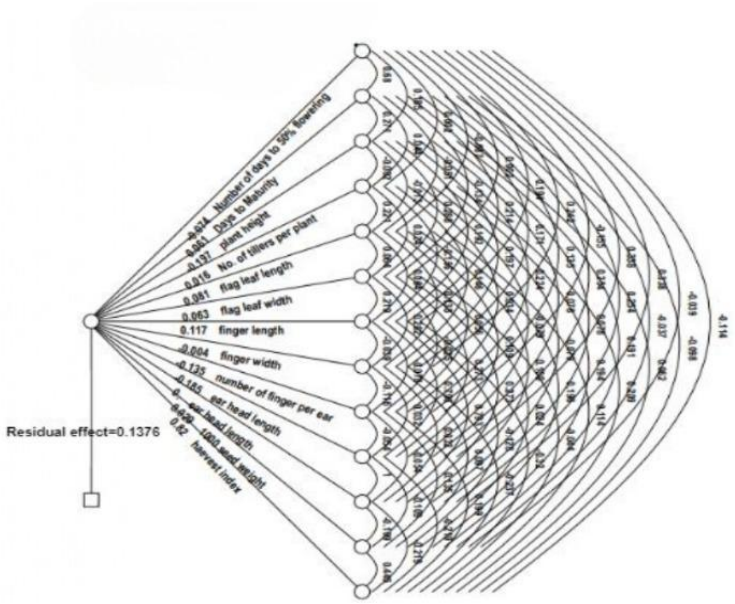


**Fig. 3. Phenotypic path diagram for grain yield per plant**

*G*: genotypic correlation, P*: phenotypic correlation*

In path analysis the traits were harvest index (0.8345*), 100 grain weight (0.6044**), Biological yield (0.6044*), Number of finger per ear (0.3973**), Ear head length (0.3488*), flag leaf length (0.2445*), Tillers (0.2002*), showed higher direct effect on grain yield per plant at phenotypic level [19]. Similar findings were reported by Eric, Negi, Keerthana [28,30,31].

## 4. CONCLUSION

- The present investigation concluded that the genotype IC NO 0473932 (FIN NO 4980) (2.22 t/ha) was maximum ear head length and highest grain yield per plant than CHECK GPU 67 (0.55 t/ha). The genotype IC NO 0473932 (FIN NO 4980) (2.22 t/ha) was 1.67 t/ha higher yield than CHECK GPU 67 (0.55 t/ha).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES


1. Goron, Travis L, Manish N Raizada. Genetic diversity and genomic resources available for the small millet crops to accelerate a New Green Revolution. Frontiers in Plant Science. 2015;6:157.
2. Karvar, SH, ER Vaidya, SN Kohakade, PR Mohurle, Sasane NA. Evaluation of genetic variability for quantitative traits in foxtail millet [*Setaria italica* (L.) P. Beauv]. Journal of Pharmacognosy and Phytochemistry. 2021;10(1):1035-1038.
3. Waghmode BD, PS Sable, NG Sonone, MM Burondkar. Genetical studies of mutant lines in m3 generation of finger millet (*Eleusine coracana* (L.) Gaertn). International Journal of Current Microbiology and Applied Sciences. 2020; 9(3):1833-1844.
4. Chandra, Dinesh, Satish Chandra, AK Sharma. Review of finger millet (*Eleusine coracana* (L.) Gaertn): A power house of health benefiting nutrients. Food Science and Human Wellness. 2016;5(3):149-155.
5. Mbanyele, Vengai, Florence Mtambanengwe, Hatirarami Nezomba, Jairos Rurinda, Paul Mapfumo. Conservation agriculture in semi-arid Zimbabwe: A promising practice to improve finger millet (*Eleusine coracana* (L.) Gaertn.) productivity and soil water availability in the short term. Agriculture. 2022;12(5):622.
6. Lule, Dagnachew, Kassahun Tesfaye, Masresha Fetene, Santie De Villiers. Inheritance and association of quantitative traits in finger millet (*Eleusine coracana* Subsp. *Coracana*) landraces collected from eastern and south eastern Africa. International Journal of Genetics. 2012; 2(2):12-21.
7. Nehru G, Trivikrama Reddy A, Chandra Mohan Reddy CV, Sreenivasulu KN. Assessment of genetic variability in indian barnyard millet genetic resources [*Echinochloa frumentacea* (L.)]. Acharya N.G. Ranga Agricultural University. 2021;134.
8. Al-Jibouri HA, Miller PA, Robinson HF. Genotypic and environmental variation and correlation in upland cotton cross of interspecies origin. Agronomy Journal. 1958;50:633-637.
9. Panse VG, Sukhatme PV. Stastical methods for Agricultural workers. 4th Edn. ICAR, New Delhi; 1985.
10. Devaliya SD, Manju singh, Visat ML. Character association and path analysis in finger millet (*Eleusine coracana* (L.) Gaertn.); 2017.
11. Gopal, Meera, T Haritha, CV Chandra Mohan Reddy, Balaji Nayak S. Genetic variability and heritability studies for yield and quality traits in white and brown finger millet (*Eleusine coracana* (L.). Journal of Plant Development Sciences. 2021;13(10): 757-766.
12. Anuradha, N, TSSK Patro, U Triveni, and P Joga Rao. Assessment of genetic variability in finger millet (*Eleusine coracana* L. Gaertn.). Journal of Pharmacognosy and Phytochemistry. 2020;9(4):764-767.
13. Shashibhushan D, Sameer Kumar CV, Ravi Kiran Reddy Kondi. Genetic parameters and association studies for yield and yield contributing traits in pearl millet cultivars; 2022.
14. Bhavsar VV, Sapkal SR, Girase VS, Barhate KK. Assessment of genetic variability among finger millet local lines collected from diverse climate; 2020.
15. Udamala, Anusha, B Vijayalakshmi, N Anuradha, TSSK Patro, Sekhar V. Studies on genetic variability for yield and quality traits in finger millet (*Eluesine coracana* (L.) Gaertn). International Journal of

Current Microbiology and Applied Sciences. 2022;9(9):2020.
16. Jyothsna S, TSSK Patro, Ashok S, Sandhya Rani Y, Neeraja B. Studies on genetic parameters, character association and path analysis of yield and its components in finger millet (*Eluesine coracana* (L.) Gaertn). International Journal of Theoretical and Applied Sciences. 2016;8 (1):25.
17. Vikram S, Sudhagar R, Masilamani P, Vanniarajan C. Genetic variability and association analysis in barnyard millet mutants. Electronic Journal of Plant Breeding. 2020;11(01):210-216.
18. Mahanthesha M, Sujatha M, Ashok Kumar Meena, Pandravada SR. Studies on variability, heritability and genetic advance for quantitative characters in finger millet [*Eleusine coracana* (L.) Gaertn] Lines. International Journal of Current Microbiology and Applied Science. 2017;6 (6):970-974.
19. Nandini B, Ravishankar CR, Mahesha B, Hittalmani Shailaja, Murthy KNK. Study of correlation and path analysis in F2 population of finger millet. International Journal of Plant Sciences (Muzaffarnagar). 2010;5(2):602-605.
20. Madhavilatha L, Sudhakar P, Latha P, Shanthi Priya M, Hemanth M. Studies on genetic variability, correlation and path analysis for quantitative traits in finger millet; 2021.
21. Annamalai R, Aananthi 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 (06):3247-3259.
22. Reddy CV, Reddy PVRM, Munirathnam P, Jayarame Gowda. Studies of genetic variability in yield and yield attributing traits of finger millet [*Eleusine coracana* (L.) Gaertn]. Indian Journal of Agricultural Research. 2013; 47(6):549-552.
23. Sharma Bunty, Laxman Kumar Chugh, Ram Kumar Sheoran, Vivek K Singh, Meenakshi Sood. Study on genetic variability, heritability and correlation in pearl millets lines. Journal of Pharmacognosy and Phytochemistry. 2018;7(6):1983-1987.
24. Chavan B, Jawale LN, Shinde AV. Correlation and path analysis studies in finger millet for yield and yield contributing traits (*Eleusine coracana* (L.) Gaertn). International Journal of Chemical Studies. 2020;8:2911-2914.
25. Dhami, Narayan Bahadur, Manoj Kandel, Suk Bahadur Gurung, Jiban Shrestha. Agronomic performance and correlation analysis of finger millet genotypes (*Elusine coracana* L.). Malaysian Journal of Sustainable Agriculture. 2018;2:16-18.
26. Kumar, Manoj, PC Gupta, and Harsh VS Shekhawat. (2016). "Correlation studies among pearl millet [*Pennisetum glaucum* (L.) R. Br.] hybrids." *Electronic Journal of Plant Breeding* 7 (3):727-729.
27. Arya, Rajesh Kumar, HP Yadav, Desh Raj, Ashok Kumar Yadav. Correlation studies of white and grey grain colour hybrids in pearl millet. Agricultural Science Digest. 2009;29 (2):23-26.
28. Eric, Manyasa Okuku, Tongoona Pangirayi, Shanahan Paul, Githiri Mwangi, Rathore Abhishek. Correlations, path coefficient analysis and heritability for quantitative traits in finger millet landraces. Philippine Journal of Science. 2016;145 (02):197-208.
29. Ganapathy S, Nirmalakumari A, Muthiah AR. Genetic variability and interrelationship analyses for economic traits in finger millet lines. World Journal of Agricultural Sciences. 2011;7(2):185-188.
30. Negi, Shivangi, Arun Bhatt, Vineet Kumar. Character association and path analysis for yield and its related traits in finger millet (*Eleusine coracana* (L.) Gaertn) genotypes. Journal of Applied and Natural Science. 2017;9(3):1624-1629.
31. Keerthana K, Chitra S, Subramanian A, Nithila S, Elangovan M. Studies on genetic variability in finger millet [*Eleusine coracana* (L.) Gaertn] genotypes under sodic conditions. Electronic Journal of Plant Breeding. 2019;10(2):566-569.



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