Advances in Bioscience and Bioengineering
2023; 11(3): 66-71
http://www.sciencepublishinggroup.com/j/abb
doi: 10.11648/j.abb.20231103.15
ISSN: 2330-4154 (Print); ISSN: 2330-4162 (Online)

Relationships and Path Coefficient Analysis of Yield and Yield-Related Traits of Finger Millet [*Eleusine coracana* (L.) Gaertn.] Genotypes at Mechara, Eastern Ethiopia

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To cite this article:

Ababa Chimdi, Bulti Tesso, Chemeda Daba, Melkamu Asfawu. Relationships and Path Coefficient Analysis of Yield and Yield-Related Traits of Finger Millet [*Eleusine coracana* (L.) Gaertn.] Genotypes at Mechara, Eastern Ethiopia. *Advances in Bioscience and Bioengineering*. Vol. 11, No. 3, 2023, pp. 66-71. doi: 10.11648/j.abb.20231103.15

Received: August 1, 2023; **Accepted**: August 16, 2023; **Published**: September 8, 2023

Abstract: Finger millet is a major grain crop in Ethiopia, but due to a lack of high-yielding cultivars and a lack of genetic information, production is not at its genetic potential. The purpose of the current study is to ascertain the direct and indirect effects of yield-related traits on grain yield in finger millet genotypes as well as the relationship between yield and yield-related variables. The current study was carried out at the Mechara Agricultural Research Center during the 2021 cropping season. Sixty-four finger millet accessions, including three checks: Ikhulule, Meba, and Kumsa, were examined for 17 characteristics using an 8 × 8 simple lattice design. The findings indicated that, both at the genotypic and phenotypic levels, grain yield had a highly significant positive connection with the number of productive tillers (0.59), thousand grain weight (0.43), biomass yield (0.47), harvest index (0.41), leaf numbers (0.32), ear weight (0.41), and number of ears (0.32). At both the genotypic and phenotypic levels, the biomass yield (0.812) and harvest index (0.803) showed a strong positive direct influence on grain yield. Therefore, to develop a high-yielding finger millet genotype, the traits of number of productive tillers, thousand grain weight, biomass yield, harvest index, leaf numbers, ear weight, and number of ears should be carefully considered in developing an effective selection strategy.

Keywords: Correlation, Finger Millet, Path Analysis, Traits

1. Introduction

Finger millet [Eleusine coracana (L.) Gaertn.], an annual allotetraploid (2n = 4x = 36, AABB), is commonly cultivated all around the world's dry and semi-arid regions. It is adapted to grow in hard and marginal agroecologies and is relatively drought-tolerant [28]. Global production of finger millet grain is predicted to be 3,834,021 tons each year [12]; however, Ethiopia's production is expected to be 1,327,267 tons, or 29.4% of global production, from 480,852 hectares of land, or 11.2% of global production [3].

The origin and diversity of finger millet are concentrated in Ethiopia [10]. However, the nation's production of finger millet is low (about 2.7 tons per hectare), much below its genetic potential of 6 tons per hectare [27]. This low production in Ethiopia is due to a number of factors, including a lack of improved varieties, a lack of sufficient information on the genetic variability study of the crop, the non-adoption of improved technologies, the prevalence of diseases like blast and lodging, moisture stress in dry areas, and the poor quality of improved varieties [6].

The complex character of grain yield is the outcome of interactions between a number of component characters and the environment [22]. How successful yield selection is depends on both the degree of genetic diversity and the strength and direction of the link between yield and its constituent characteristics, as well as between them [15].

The true dependency of grain yield on the correlated yield component traits needs to be confirmed because correlation studies alone are frequently deceptive. Path coefficient analysis makes it simple to tackle this issue [2]. Therefore, this study sought to understand the relationship between yield and yield-related traits of finger millet genotypes and to determine the direct and indirect effects of yield-related traits on grain yield of finger mille genotypes.

2. Materials and Methods

2.1. Description of the Study Area

The experiment was conducted at the Mechara Agricultural Research Center throughout the 2021 growing season. The center is located at 8°35'.589" N and 40°19'.114" E. The center is at 1760 m. a. s. l., and its yearly average temperature ranges from 14 to 26°C. The soil is primarily clay-based, reddish brown in color, and has a pH range of 5.3 to 6.3.

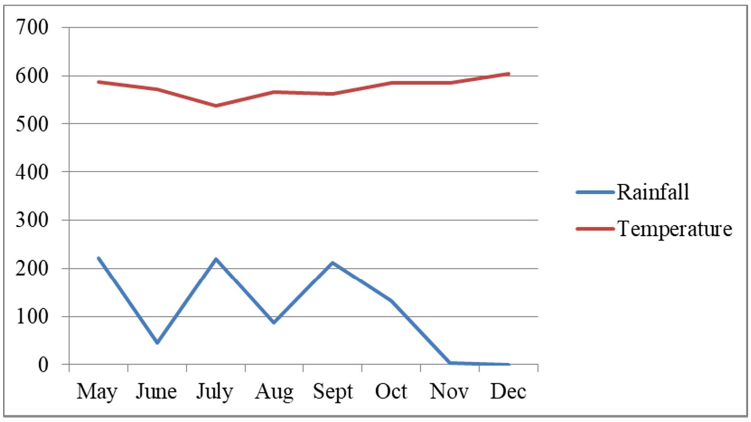

Figure 1. *Chart showing the distribution of rainfall and temperature at Mehara agricultural Research center in the 2021 cropping period.*

2.2. Experimental Materials and Design

The study's materials included three newly released varieties of finger millet and 61 genotypes gathered from various Ethiopian locations (Table 1). Each genotype was planted in a plot with four rows that were 5 m long and 1.2 m wide, with an inter and intra spacing of 40 cm and 10 cm, respectively. The experiment was set up using an 8 x 8 simple lattice design. The seeds were sown by hand drilling at a rate of 10 kg ha^{-1}. For finger millet, every agronomic treatment has been carried out as recommended.

2.3. Data Collection

Following the descriptors for finger millet [11], the data were collected from two central rows for plot-based and on five randomly sampled plants for plant-based on the following traits: days to 50% heading, days to 50% maturity, number of leaves per plant, plant height (cm), number of tillers per plant, number of productive tillers per plant, number of fingers per main ear, finger length (cm), finger width (cm), number of ear-heads per plant, ear-head length (cm), ear-head width (cm), ear-head weight (g), thousand grain weight (g), biomass yield (tons ha^{-1}), harvest index (%), and grain yield (tons ha^{-1}).

Table 1. *List of finger millet accession with their passport data.*

S/N	Accession number	Collection region	Lon gitude	Lati Tude	S/N	Accession number	Collection region	Lon gitude	Lati Tude
1	ACC#244798	SNNP	37.9	7.3	33	ACC#216055	Oromia	35.3	9
2	ACC#243644	Amhara	36.6	11	34	ACC#216035	Oromia	35.7	9.3
3	ACC#243638	Amhara	37.3	12	35	ACC#219818	Tigray	38.9	14
4	Ikhulule	Released			36	ACC#216048	Oromia	35.2	
5	ACC#245088	Oromia	37.2	9.8	37	ACC#219807	Tigray	38.7	
6	ACC#243640	Amhara	36.8	11	38	ACC#216049	Oromia	35.1	9.8
7	ACC#243637	Amhara	37.3	12	39	ACC#216052	Oromia	35.6	9.1
8	ACC#245092	Oromia	36.4	8.5	40	ACC#216037	Oromia	35.6	9.4
9	ACC#237969	Oromia	37.6	9.8	41	ACC#228304	Amhara	37.7	13
10	ACC#237583	Oromia	38.6	7.2	42	ACC#234187	Tigray	38.2	14.1
11	ACC#238303	Tigray	39.6	13	43	ACC#229722	B- Gumuz	36.7	11.2
12	ACC#238337	Tigray	38.1	14	44	ACC#219824	Tigray	38.3	14.2
13	ACC#238320	Tigray	38.1	14	45	ACC#234175	Tigray	38.1	14
14	ACC#238297	Tigray	38.1	14	46	ACC#229726	B- Gumuz	36.2	10.7
15	ACC#238333	Tigray	38.2	14	47	ACC#230255	B- Gumuz	36.7	11.2
16	ACC#238306	Tigray	38.1	14	48	ACC#228902	Oromia	36.2	8.6
17	ACC#215908	Amhara	36.9	11	49	ACC#215869	Amhara	37.4	11.4

S/N	Accession number	Collection region	Lon gitude	Lati Tude	S/N	Accession number	Collection region	Lon gitude	Lati Tude
18	ACC#215976	Amhara	37.3	12	50	ACC#208724	Oromia	37.6	9.8
19	Meba	Released			51	ACC#208448	Amhara	36.4	11.1
20	ACC#215968	Amhara	37.5	13	52	ACC#212694	Amhara	38	11.8
21	ACC#240506	Amhara	37.7	11	53	ACC#208726	Oromia	36.8	8.5
22	ACC#216033	Oromia	35.7	9.3	54	ACC#215883	Amhara	37.7	11.1
23	ACC#215994	Amhara	37.7	12	55	ACC#208446	Amhara	37.4	12.4
24	ACC#215889	Amhara	37.1	11	56	ACC#215873	Amhara	37.4	11.4
25	Kumssa	Released			57	ACC#240506	SNNP	35.8	7.3
26	ACC#235141	Amhara	37.4	12	58	ACC#242131	Amhara	37.4	12.5
27	ACC#234202	Tigray	38.5	14	59	ACC#242105	Amhara	37.6	11.2
28	ACC#237468	Tigray	38	14	60	ACC#243617	Amhara	39.8	11
29	ACC#234198	Tigray	38.3	14	61	ACC#242628	Tigray	39.6	14.1
30	ACC#237463	Tigray	38.8	14	62	ACC#241769	SNNP	37.5	5.5
31	ACC#237452	Tigray	38.8	14	63	ACC#242618	Tigray	39.6	14.6
32	ACC#234208	Tigray	37.7	14	64	ACC#242620	Tigray	38.4	14.8

Where: ACC# = Accession number; S/N = Serial number; B-Gumuz = Benishangul-Gumuz; SNNP = Southern Nations, Nationalities, and People's Region.

2.4. Correlation Coefficient Analysis

The following method was used to calculate the genotypic and phenotypic correlation coefficients between dependent and independent variables [14, 24].

$$\text{Phenotypic coefficient of correlation (rp)} = \frac{\mathrm{Pcov}_{xy}}{\sqrt{Vp_x . Vp_y}}$$

Where; $Pcov_{xy}$ = Phenotypic covariance between variables x and y, V_px = Phenotypic variance of variable x, V_py = Phenotypic variance of variable y

$$\text{Genotypic correlation coefficient } (r_g) = \frac{\mathrm{Gcov}_{xy}}{\sqrt{Vg_x . Vg_y}}$$

Where; $Gcov_{xy}$ = Genotypic covariance between variables x and y, V_gx = Genotypic variance of variable x, V_gy = Genotypic variance of variable y.

2.5. Path Coefficient Analysis

Path coefficient analysis was carried out as follows [7].

$$rij = Pij + \Sigma rik\ pkj$$

Where: rij = mutual association between the independent character (i) and dependent character (j) as measured by the genotypic and phenotypic correlation coefficients, Pij = direct effects of the independent character (i) on the dependent variable (j) as measured by the genotypic path coefficients, and Σrikpkj = Summation of components of indirect effects of a given independent character (i) on a given dependent character (j) via all other independent characters (k).

The following formula was used to calculate the residual effect, which assesses how well the causal factors explain the variability of the dependent factor yield:

$$1 = p^2R + \Sigma\ pij\ rij$$

Where, p^2R is the residual effect, Pij rij = the product of direct effect of any variable and its correlation coefficient with yield.

The scales of path coefficient values are 0.00 to 0.09 as negligible, 0.10 to 0.19 as low, 0.20 to 0.29 as moderate, 0.30 to 0.99 as high, and more than 1.00 as a very high path coefficient [16].

3. Results and Discussion

3.1. Genotypic and Phenotypic Correlation Coefficients

Estimates of genotypic and phenotypic correlation coefficients for all traits are summarized in Table 2. The number of leaves, productive tillers, number of ears, ear weight, 1000 grain weight, biomass yield, and harvest index all showed highly significant and positive genotypic and phenotypic correlations with grain yield; however, the number of fingers, finger width, ear length, and ear width only showed highly significant correlations at the phenotypic level, despite showing significant positive genotypic correlations with grain yield. This suggests that by enhancing one or more of the traits, the grain yield also increased [9, 19, 25].

At both the genotypic and phenotypic levels, there were highly significant and negative relationships between grain yield and the characteristics of days to heading and days to maturity [5, 21]. This negative correlation is useful if it is predicted that the low moisture stress that dominates during the crop's growth will result in a reduction in environmental pressures. Positive and highly significant genotypic and phenotypic associations existed between days to heading and days to maturity. The harvest index and the number of ears per plant showed a highly significant negative phenotypic connection with these variables. Both at the genotypic and phenotypic levels, there was a significant negative connection between it and 1000 grain weight [9, 13].

Plant height and leaf number, ear weight per plant, and biomass yield all showed positive and highly significant genotypic and phenotypic relationships. Plant height is positively and significantly associated with the number of fingers per ear, finger length, and ear length at the phenotypic level but negatively and significantly correlated with the number of ears per plant at both the genotypic and phenotypic levels [13, 19].

At the genotypic level, there were positive and strong correlations between the number of productive tillers and the number of fingers, finger width, ears, and ear weight [17]. The number of fingers had positive and highly significant correlations with ear width, finger length, and ear weight at both the genotypic and phenotypic levels. At the genotypic level, the number of productive tillers, plant height, ear weight, and biomass yield had positive and significant correlations with the number of fingers per main ear [4].

Thousand grain weights showed a positive and highly significant phenotypic correlation with harvest index, whereas there was a positive and significant correlation with leaf numbers and the number of ears per plant at the phenotypic level. But at both genotypic and phenotypic levels, it was significant and negatively correlated with days to maturity and days to heading [4]. At both phenotype and genotype levels, biomass yield was positively and significantly correlated with leaf number, productive tiller, plant height, number of fingers per ear, ear weight, and ear width but negatively and significantly correlated with harvest index [1, 26].

Table 2. *Genotypic (above diagonal) and phenotypic (below diagonal) correlation coefficients for yield and yield-related traits of 64 finger millet genotypes.*

Traits	DH	DM	LN	NT	NPT	PH	NFPE	FL	Fwd	NEPP	EL	Ewd	EW	TSW	BMY	HI	GY
DH	1.00	0.87**	0.05ns	-0.09ns	-0.06ns	0.20ns	0.05ns	-0.04ns	-0.06ns	-0.34**	-0.07ns	-0.23ns	-0.13ns	-0.25*	-0.10ns	-0.29*	-0.41**
DM	0.84**	1.00	-0.03ns	-0.07ns	-0.06ns	0.11ns	0.04ns	-0.09ns	-0.04ns	-0.37**	-0.12ns	-0.22ns	-0.17ns	-0.25*	-0.18ns	-0.32**	-0.54**
LN	0.05ns	-0.05ns	1.00	0.04ns	0.08ns	0.61**	0.23ns	0.16ns	0.21ns	-0.32**	0.21ns	0.20ns	0.30*	0.21ns	0.46**	-0.15ns	0.32**
NT	-0.10ns	-0.08ns	0.03ns	1.00	0.61**	-0.11ns	0.07ns	0.19ns	0.14ns	0.24ns	0.20ns	0.15ns	-0.15ns	0.00ns	0.13ns	0.06ns	0.22ns
NPT	-0.08ns	-0.11ns	0.05ns	0.57**	1.00	-0.08ns	0.29*	0.09ns	0.29*	0.27*	0.15ns	0.21ns	0.17ns	0.08ns	0.33**	0.17ns	0.59**
PH	0.18*	0.12ns	0.57**	-0.11ns	-0.18*	1.00	0.28*	0.25*	-0.03ns	-0.32**	0.25*	0.06ns	0.27*	0.01ns	0.27*	-0.23ns	0.07ns
NFPE	0.05ns	0.01ns	0.24**	0.01ns	0.22*	0.24**	1.00	0.34**	-0.09ns	-0.10ns	0.37**	0.51**	0.25*	0.00ns	0.27*	-0.05ns	0.28*
FL	-0.03ns	-0.08ns	0.20*	0.14ns	0.04ns	0.29**	0.34**	1.00	0.13ns	0.04ns	0.98**	0.55**	0.05ns	-0.13ns	0.06ns	0.07ns	0.16ns
Fwd	-0.04ns	-0.02ns	0.20*	0.15ns	0.28**	-0.00ns	-0.05ns	0.12ns	1.00	0.11ns	0.19ns	0.17ns	0.08ns	0.18ns	0.17ns	0.08ns	0.27*
NEPP	-0.30**	-0.34**	-0.22*	0.22*	0.23**	-0.26**	-0.06ns	0.08ns	0.13ns	1.00	0.06ns	0.04ns	-0.23ns	0.21ns	0.09ns	0.20ns	0.32**
EL	-0.05ns	-0.11ns	0.25**	0.14ns	0.09ns	0.28**	0.37**	0.97**	0.17ns	0.10ns	1.00	0.60**	0.09ns	-0.07ns	0.13ns	0.07ns	0.25*
Ewd	-0.20*	-0.19*	0.21*	0.08ns	0.16ns	0.03ns	0.43**	0.49**	0.15ns	0.08ns	0.55**	1.00	0.14ns	0.03ns	0.18ns	0.05ns	0.27*
EW	-0.12ns	-0.16ns	0.29**	-0.14ns	0.18*	0.22*	0.23**	0.06ns	0.09ns	-0.16ns	0.10ns	0.14ns	1.00	0.23ns	0.20*	0.04ns	0.41**
TSW	-0.22*	-0.22*	0.19*	-0.03ns	0.06ns	-0.01ns	0.03ns	-0.09ns	0.15ns	0.19*	-0.04ns	0.06ns	0.26**	1.00	0.19ns	0.24ns	0.43**
BMY	-0.09ns	-0.16ns	0.43**	0.10ns	0.31**	0.28*	0.27**	0.09ns	0.17ns	0.08ns	0.16ns	0.19*	0.29**	0.16ns	1.00	-0.57**	0.47**
HI	-0.23**	-0.27**	-0.07ns	0.05ns	0.11ns	-0.17*	-0.03ns	0.08ns	0.09ns	0.22*	0.11ns	0.09ns	0.07ns	0.24**	-0.53**	1.00	0.41**
GY	-0.33**	-0.45**	0.35**	0.16ns	0.47**	0.09ns	0.28**	0.19*	0.27**	0.34**	0.30**	0.31**	0.41**	0.40**	0.47**	0.45**	1.00

Note that *, **, and ns are significant at 5%, highly significant at TS%, and non-significant at the 5% level of significance, respectively, DH = days to 50% heading, DM = days to 50% maturity, LN = number of leaves per plant, NT = number of tillers per plant, NPT = number of productive tillers per plant, PH = plant height (cm), NFPE = number of fingers per main ear-head, FL = finger length (cm), Fwd = finger width (cm), NEPP = number of ear-head per plant, EL = ear-head length (cm), EW = ear-head weight (g), TGW = 1000-grain weight (g), BMY = biomass yield (ton ha^{-1}), HI = harvest index (%), GY = grain yield (ton ha^{-1})

3.2. Genotypic Direct and Indirect Effects

The findings of the genotypic path coefficient analysis are summarized in Table 3. At the genotypic level, grain yield was positively and significantly influenced by biomass yield (0.812) and harvest index (0.803). There were positive and significant direct effects on grain yield at the genotypic level for the number of productive tillers per plant (0.137), days to heading (0.083), ear weight (0.082), number of fingers per ear (0.049), ear length (0.04), number of ears per plant (0.038), 1000-grain weight (0.03), leaf numbers per plant (0.013), and finger width (0.012) [9, 23, 25].

On the other hand, ear width (-0.034) and days to maturity (-0.169) had a negative direct impact on grain yield. The selection of finger millet genotypes with early to medium maturities may result in significant grain yields, allowing grain filling time to be prolonged and terminal moisture stress to be avoided, especially under Mechara conditions [23].

The path analysis showed that high-to-low indirect positive effects on grain yield were observed for leaf numbers (0.371), number of productive tillers (0.271), ear weight (0.242), number of fingers per ear (0.22), 1000-grain weight (0.153), ear width (0.146), finger width (0.137), and ear length (0.108) via biomass yield at the genotypic level (Table 3). Hence, these traits should be considered simultaneously as indirect selection criteria for grain yield improvement [8, 15]. At the genotypic level, traits like 1000 grain weight, number of ears per plant, number of productive tillers, finger width, ear length, ear width, and ear weight have an indirect positive effect on grain yield via the harvest index [20].

3.3. Phenotypic Direct and Indirect Effect

The results of the phenotypic path coefficient analysis are presented in Table 3. Harvest index (0.839), biomass yield (0.816), ear length (0.17), ear weight (0.087), number of productive tillers (0.08), number of ears (0.071), number of fingers per ear (0.031), days to heading (0.029), leaf number (0.023), ear width (0.017), 1000-grain weight (0.01), and finger width (0.001) all had positive and highly significant phenotypic direct effects on grain yield (Table 3). Therefore, the best way to increase the grain production of finger millet would be to select for these traits [8, 17, 20]. Finger length (-0.105) and days to maturity (-0.05) had a negative direct impact on grain yield [17, 20].

Through biomass yield, leaf number had a significant indirect positive phenotypic influence on grain yield. The number of productive tillers, ear weight, and number of fingers, as well as ear width, finger width, ear length, and 1000-grain weight, all had positive but low indirect effects. The number of ears and the length of the fingers exhibited positive but low indirect impacts on biomass yield [29]. Through harvest index and biomass yield, respectively, the thousand grain weight and number of leaves had the biggest positive indirect effects on grain yield [18]. Due to the intricacy of grain yield, the phenotypic direct and indirect impacts were frequently slightly bigger than the genotypic effects (Table 3).

Table 3. *Estimates of direct (bold diagonal) and indirect (off diagonal) effects on yield-related traits at the genotypic (G) and phenotypic (P) level in finger millet genotypes.*

Trait		DH	DM	LN	NPT	NFPE	FL	Fwd	NEPP	EL	Ewd	EW	TSW	BMY	HI	GY
DH	G	0.083	-0.146	0.001	-0.008	0.003		-0.001	-0.013	-0.003	0.008	-0.010	-0.007	-0.083	-0.229	-0.407**
	P	0.029	-0.042	0.001	-0.006	0.001	0.003	0.000	-0.021	-0.006	-0.003	-0.011	-0.002	-0.077	-0.195	-0.329**
DM	G	0.072	-0.169	0.000	-0.008	0.002		0.000	-0.014	-0.005	0.007	-0.014	-0.007	-0.143	-0.260	-0.539**
	P	0.024	-0.050	-0.001	-0.009	0.000	0.008	0.000	-0.024	-0.013	-0.003	-0.014	-0.002	-0.132	-0.230	-0.446**
LN	G	0.004	0.005	0.013	0.011	0.011		0.002	-0.012	0.009	-0.007	0.024	0.006	0.371	-0.117	0.320**
	P	0.001	0.002	0.023	0.004	0.007	-0.021	0.000	-0.016	0.029	0.004	0.025	0.002	0.349	-0.058	0.354**
NPT	G	-0.005	0.010	0.001	0.137	0.014		0.003	0.010	0.006	-0.007	0.014	0.002	0.271	0.135	0.591**
	P	-0.002	0.006	0.001	0.080	0.007	-0.004	0.000	0.016	0.010	0.003	0.016	0.001	0.249	0.090	0.473**
NFPE	G	0.004	-0.007	0.003	0.039	0.049		-0.001	-0.004	0.015	-0.017	0.021	0.000	0.222	-0.043	0.280*
	P	0.001	0.000	0.005	0.018	0.031	-0.036	0.000	-0.004	0.043	0.007	0.020	0.000	0.220	-0.024	0.282**
FL	P	-0.001	0.004	0.004	0.003	0.011	-0.105	0.000	0.006	0.114	0.008	0.005	-0.001	0.073	0.070	0.192*
Fwd	G	-0.005	0.006	0.003	0.040	-0.005		0.012	0.004	0.008	-0.006	0.006	0.005	0.137	0.066	0.272*
	P	-0.001	0.001	0.004	0.023	-0.002	-0.013	0.001	0.009	0.020	0.003	0.008	0.002	0.138	0.082	0.274**
NEPP	G	-0.029	0.063	-0.004	0.037	-0.005		0.001	0.038	0.003	-0.001	-0.019	0.006	0.071	0.162	0.324**
	P	-0.009	0.017	-0.005	0.019	-0.002	-0.009	0.000	0.071	0.012	0.001	-0.014	0.002	0.066	0.187	0.337**
EL	G	-0.006	0.021	0.003	0.020	0.018		0.002	0.002	0.040	-0.021	0.007	-0.002	0.108	0.056	0.250*
	P	-0.002	0.006	0.006	0.007	0.012	-0.102	0.000	0.007	0.117	0.009	0.009	0.000	0.134	0.094	0.296**
Ewd	G	-0.019	0.037	0.002	0.029	0.025		0.002	0.002	0.024	-0.034	0.011	0.001	0.146	0.039	0.265*
	P	-0.006	0.009	0.005	0.013	0.013	-0.051	0.000	0.006	0.064	0.017	0.012	0.001	0.154	0.076	0.313**
EW	G	-0.010	0.028	0.004	0.023	0.012		0.001	-0.008	0.004	-0.005	0.082	0.007	0.242	0.032	0.411**
	P	-0.004	0.008	0.007	0.014	0.007	-0.006	0.000	-0.011	0.012	0.002	0.087	0.003	0.237	0.056	0.413**
TSW	G	-0.021	0.042	0.003	0.010	0.000		0.002	0.008	-0.003	-0.001	0.019	0.030	0.153	0.189	0.432**
	P	-0.006	0.011	0.004	0.004	0.001	0.010	0.000	0.013	-0.004	0.001	0.023	0.010	0.133	0.204	0.403**
BMY	G	-0.009	0.030	0.006	0.046	0.013		0.002	0.003	0.005	-0.006	0.025	0.006	0.812	-0.461	0.472**
	P	-0.003	0.008	0.010	0.024	0.008	-0.009	0.000	0.006	0.019	0.003	0.025	0.002	0.816	-0.444	0.466**
HI	G	-0.024	0.055	-0.002	0.023	-0.003		0.001	0.008	0.003	-0.002	0.003	0.007	-0.466	0.803	0.407**
	P	-0.007	0.014	-0.002	0.009	-0.001	-0.009	0.000	0.016	0.013	0.002	0.006	0.003	-0.431	0.839	0.451**

Residual = 0.27 and 0.3 at genotypic and phenotypic level respectively

4. Conclusion

Relationship information is essential for progress and the efficient utilization of the genetic resources available. Highly significant and positive genotypic and phenotypic correlations were found between grain yield and variables like the number of leaves, the number of productive tillers, the number of ears per plant, the weight of the ear, the weight of 1000 grains, the biomass yield, and the harvest index. While leaf numbers, the number of productive tillers, ear weight, the number of fingers per ear, 1000-grain weight, ear width, finger width, and ear length showed a high positive indirect effect on grain yield, Biomass yield and harvest index showed a strong positive direct effect on grain yield at both the genotypic and phenotypic levels. These traits ought to be taken into consideration as selection criteria since they are employed in the genetic modification of finger millet to increase grain yield.

Conflict of Interest

Among the authors, there is no conflict of interest.

Acknowledgements

The author gratefully acknowledged the Oromia Agricultural Research Institute (OARI) and Mechara Agricultural Research Center (McARC) for their financial support.

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