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Genetic Variability, Correlation and Path Coefficient Studies in Elephant Foot Yam (*Amorphophallus campanulatus* Bl.)

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Abstract

An investigation has been made to characterize the local accessions of Elephant foot yam collected from thirteen aroid growing districts and in-depth study on genetic variability, correlation and path coefficient for plant height, petiole length, petiole breadth, leaf area index, corm length, corm breadth, corm weight, cormel number, cormel length, cormel breadth, cormel weight and yield per plant has also been carried out. Genotypic variances and coefficient of variation for most of the characters were remarkably higher than their corresponding environmental variances, which also indicate the existence of variation in genotypic origin. High heritability with high genetic advance in percentage of mean was also observed for all characters. In the correlation study plant height, leaf area index, corm length, corm breadth, corm weight, cormel number, cormel length, cormel breath showed positive correlation with yield per plant in genotypic and phenotypic level. Leaf area index, cormel number in phenotypically and cormel number in genotypic level showed relatively high positive direct effect on yield per plant.

Keywords: Amorphophallus; Genetic variability; Correlation; Path coefficient.

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1. Introduction

Elephant foot yam, of the genus *Amorphophallus* (locally called olkachu) is one of the most underutilized tuber crops of the tropics, locally called Olkachu. All the edible aroids of Indonesia [1]. briefly described 7 species of *Amorphophallus* (*A. variabilis, A .campanulatus, A. blumei, A. decus-sylvae, A. spectabilis, A. prainii and A.titanum*). It is called as *A. campanulatus syn A. painiifolius* in Bangladesh. It belongs to Araceae family and it is found from Madagascar to the Polynesian Islands. In Bangladesh it is an important aroid crop in the northern and southern district including Chittagong Hill tracts. It is an important vegetable in Bangladesh and it contributes a considerable part of the

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total supply of bulky vegetables particularly during the lean period when the vegetables are scarce in the market during August and September [2]. The world's rapid population growth is demanding increased production and greater diversification of crops. Roots and tubers can play a major role in addressing this issue. Therefore there is a need to intensify activities that relate to better conservation and efficient use of root and tuber genetic resources. Tuber can be utilized both as animal feed and for human consumption [3]. A number of medicinal properties are associated with the treatment of piles and dysentery, acute rheumatism [4]. In Bangladesh very little research works on edible aroids had been done. Here it is absolutely an under utilized crop and not yet accepted as a general crop of the farmers The genetic variability in a population along with heritability gives a reliable idea of the genetic advance to be ejected from selection for a given character [5, 6]. The degree of relationship and association of these components with yield can be measured by the correlation coefficient studies. Estimation of genetic association along with phenotypic correlation not only displays a clear picture of the extent of inherent association but also indicates how much of this phenotypically expressed correlation is influenced by the environment. It is suggested by ref. [7] that mightly sometimes be possible to achieve more rapid progress under selection for a correlated responses than from selection for the components of correlation coefficient into direct and indirect effects and visualizes the relationship in more meaningful way. The main objective of this present investigation was to estimate the genetic variability, correlation among characters and direct & indirect effect between characters for identification of best genotypes from *Amorphophallus campanulatus Bl.* towards tuber yield.

2. Materials and Methods

2.1. *Plant materials*

Elephant yam accessions were collected from aroid growing area such as Arani, Godagari and Meher chandi of Rajshahi, Tala of Satkhira, Churamonkati and of chougacha of Jessore, Santhahar of Bogra, Panchbibi of Joypurhat, Munshiganj and Joydebpur of Dhaka, Madhupur of Mymensingh and sadar upozilla of Barisal of Bangladesh in 2005-2006. Collected propagules are the mainly corms and cormels. Propagules are maintained at the experimental farm of the Institute of Biological sciences in 2005-2006.

2.2. *Production methodology*

This investigation was conducted at the experimental farm of the Institute of Biological Sciences research field at Rajshahi University, Rajshahi during the on set of rainy season 2005 - 2006 .The land in which the experiment was carried out was medium high. The accessions were grown in loamy soil in a single row of 4 meters length with inter row spacing of 75 cm. The soil was part of Level Barind agroecological Zone marked by sandy loam with pH 6.5. The rainfall distribution in rabi season was very low or scanty

(< 40 cm). So that at least 3 – 4 times flood irrigation were necessary. All recommended agricultural practices were followed. The corm or cormels of elephant yam were sown on March, 2006. Two healthy propagules were planted per hill during plantation and finally a single healthy plant was maintained.

2.3. ***Experimental design***

The experiment was set up in a Randomized Complete Block (RCB) design with three replications. In each experimental plot plant propagules are planted with row to row 0.75m and plant to plant 0.60m spacing was maintained.

2.4. ***Data recording***

When plant and vegetative growth is very stunted, leaves become yellowish, dry and dropping then the quantitative parameters were observed and data were recorded following descriptors of Taro with necessary modifications [8]. The morphological characters were recorded from randomly selected five plants from selected genotypes between 170 days after planting, while yield and other characters were recorded at harvest. Leaf observations were made on two fully developed leaves per plant and recorded the average of three plants. Plant height (PLH): Plant height was measured from soil surface to tip of the flag leaf (terminal leaf) tip. It was measured by centimeter. Petiole length (PEL): The length between the base of the plant and point of insertion or junction of leaf expressed in centimeter. Petiole breadth (PEB): Average measurements were taken for three position of petiole such as petiole base, middle position and junction of leaf attachment (in cm). Leaf length (LEL): The leaf length was measured from leaf base to leaf apex (in cm). Leaf breadth (LEB): The cross length of one end to the other end of leaf lamina measured by centimeter. Leaf area Index (LAI): It was calculated as leaf length x leaf breadth x 0.75 [9]. Corm length (CRL): The length of corm length was measured by scale or tape through vertically (in cm). Corm breadth (CRB): Breadth of the rhizome was measured horizontally through the middle position of corm (in cm). Corm weight (CRW): After harvesting the corm was weighted (in gm). Cormel length (COL): The length of cormel length was measured by scale or tape through vertically (in cm). Cormel breadth (COB): Breadth of the cormel was measured horizontally through the middle position of corm (in cm). Cormel number (CON): The number of cormels present or attached adjacent to the corm after harvesting. Cormel weight (COW): After detaching or separating the cormlet from corm .weight was measured (in gm). Yield per plant (YPP): It included the total weight of corm and cormels in gm.

2.5. ***Statistical analysis***

The collected data were analyzed following the biometrical techniques of analysis developed by [10] based on mathematical model [11] using the SPSS and Microsoft Excel

Software. The analysis of variance for each character under the study was performed by F Test [12]. Mean, Range, Critical difference (CD), Genotypic and phenotypic variances were estimated following [6] and components of variances followed by [13]. Broad sense heritability was estimated by [6,14]. The expected genetic advance for different characters under selection was estimated by the formula as suggested by [15, 16] Genetic advance in percentage of mean was calculated from the formula [17]. For the purpose of correlation and path coefficient analysis, variance and covariance analysis followed by [18]. Phenotypic, genotypic and environmental correlation coefficient for all possible combinations was computed from the components of variance and covariance following [19]. The path coefficient analysis was done using Wright formula [20, 21] which had been extended in ref. [22].

3. Results and Discussions

3.1. *Genetic variability*

Genetic parameters along with range and grand mean for each character is shown in Table 1. As shown in the table high ranges of variation were observed for all the characters which pronounced the existence of wide scale variability. Phenotypic

Table 1. Estimates of range and genetic parameters for yield and yield contributing characters of Elephant Foot Yam (*A. campanulatus*).

Genetic param.	PLH	PEL	PEB	LAI	CRL	CRB	CRW	COW	CON	COL	COB	YPP
Range	45.00 - 113.00	23.00-59.00	5.00-9.66	0.038-0.92	4.00-18.00	15.00-50.00	90.00-1600	40.00-650.00	3.00-45.00	2.00-10.00	5.00-12.00	180.00 – 2100
σ^2_p	3815.9	700.5	9.30	0.0817	106.97	296.96	720558	16616	214.6	24.53	9.69	918413.33
σ^2_g	3750.2	682.30	8.63	0.069	102.92	277.16	696284	10317	171.8	22.94	7.83	875368.33
σ^2_e	65.70	18.20	0.67	0.014	4.05	19.80	24274	6299	42.8	1.59	1.86	43045
CV_P	89.65	75.38	47.77	232.38	100.31	68.93	193.71	77.51	111.14	88.17	40.69	156.87
CV_g	88.88	73.64	46.02	212.78	98.39	66.59	190.42	61.06	99.44	85.26	36.57	153.15
CV_e	11.76	12.81	12.82	93.40	19.51	17.79	35.35	47.72	49.63	22.44	17.82	33.96
h^2 (bs)	98.27	97.40	92.79	83.84	96.21	93.33	96.63	99.88	80.05	93.91	80.80	95.31
GA	124.78	53.10	5.82	0.493	20.49	33.12	1678.70	3744.08	24.14	9.54	5.18	1881.39
GA%	180.98	151.23	91.18	400.31	198.73	132.48	353.09	2257.48	183.15	169.84	67.71	303.05

Plant height (PLH), petiole length (PEL), petiole breadth (PEB), leaf area index (LAI), corm length (CRL), corm breadth (CRB), corm weight (CRW), cormel weight (COW), cormel number (CON), cormel length (COL), cormel breadth (COB) and yield per plant (YPP).

variances for all the characters were found higher than their corresponding genotypic and environmental variances as expected. But on close observation it was indicated that the magnitude of phenotypic variances and coefficient of variability were much higher than their corresponding genotypic values in all the characters. σ^2_g and cv_g for all characters were also higher than their corresponding σ_e^2 and cv_e. Maximum higher values of σ^2_p and cv_p than the σ^2_g and cv_g; σ^2_e and cv_e lower than both of σ^2_p and cv_p and σ^2_g and cv_g for all characters. The almost all characters exhibited higher phenotypic variances than their corresponding genotypic variances, but the differences between σ^2_p and σ^2_g were somewhat in similar or in considerable level. Higher σ^2_p together with lower σ^2_e than σ^2_g for these characters suggested the existence of genetic variability, but the phenotypic variations were also moderately influenced by the environment as well as interaction of different levels. Most of the characters exhibited more than 80 % heritability. The results of genetic advances for plant height, petiole length, leaf length, leaf breadth, corm breadth, corm weight, and yield per plant showed high and moderate but low in cormel length and cormel breadth.

3.2. *Correlation coefficients*

Correlation coefficients between all possible pairs of characters both at phenotypic and genotypic levels were computed from the components of variance and covariance matrix to measure the nature and magnitude of mutual relationship between corm yield and its component characters. Phenotypic (r_p) and genotypic (r_g) correlation coefficients of yield and yield contributing characters of elephant foot yam are presented in Table 2.

3.2.1. *In phenotypic level*

Plant height failed to show significant association with all characters in phenotypic level. Petiole length showed highly significant and positive correlation with cormel weight (0.992). Petiole length failed to show any significant relationship with any of the characters studied under genotypic and phenotypic levels. At the phenotypic level leaf area index showed highly significant and positive correlation with yield per plant (0.574). At phenotypic level corm weight showed significant and positive correlation with cormel weight (0.481). Phenotypically highly significant and positive correlation was exhibited with yield per plant (0.624).

3.2.2. *In Genotypic level*

In case of genotypic level, plant height showed highly significant and positive correlation with corm breadth (0.960). Negative and highly significant correlation also found with petiole breadth (-0.852) and corm breadth (-0.540). Petiole breadth showed significantly high positive correlation at genotypic level with corm breadth (0.630). Leaf length failed to show any significant correlation with other characters in genotypic and phenotypic level. In genotypic level only showed significant and positive correlation with yield per plant (0.486).

Table 2. Phenotypic (above the diagonal) and genotypic (below the diagonal) correlation coefficients for yield and yield contributing characters of elephant foot yam.

Character	PLH	PEL	PEB	LAI	CRL	CRB	CRW	COW	CON	COL	COB	YPP
PLH	1	0.060	0.037	0.053	0.053	0.050	0.060	0.078	0.049	0.055	0.039	0.064
PEL	0.053	1	0.064	0.027	0.053	0.056	0.061	0.074	-0.132	0.060	0.056	0.063
PEB	0.074	0.093	1	0.130	0.057	0.038	0.057	0.100	-0.042	0.059	0.060	0.065
LAI	0.055	0.024	0.043	1	0.065	0.063	0.041	0.076	-0.076	0.119	0.041	0.574*
CRL	0.051	0.053	0.052	0.047	1	0.075	0.076	0.108	-0.028	0.042	0.067	0.080
CRB	0. 960**	0.057	0.630**	0.038	-0.012	1	0.081	0.116	0.011	0.041	0.049	0.292
CRW	0.055	0.054	0.063	0.049	0.042	0.038	1	0.379	0.007	0.052	0.063	0.179
COW	0.064	-0.039	0.082	0.024	0.013	0.043	-0.088	1	0.137	-0.529*	0.142	0.269
CON	-0.057	-0.008	-0.058	-0.055	0.067	-0.061	-0.080	-0.131	1	-0.014	0.035	0. 624**
COL	0.049	0.054	0.023	-0.079	0.053	0.039	0.052	0.427	-0.054	1	0.088	0.053
COB	0.055	0.061	0.045	0.050	0.040	0.045	0.048	0.059	-0.051	0.105	1	0.075
SUN	0.037	0.050	0.022	0.030	0.069	0.069	0.051	0.011	-0.117	0.081	0.036	0. 580*
YPP	0.057	0.055	0.066	0.051	0.042	0.065	0.003	-0.030	0.486*	0.052	0.047	1

* Significant at 0.05 level; ** significant at 0.01 level.

4. Path Analysis

In present investigation path coefficient analysis was performed using genotypic and phenotypic correlation to assess direct and indirect influences of different variables on tuber yield of elephant foot yam. Yield was considered as resultant variables and remaining characters were considered as causal variables. Estimates of direct and indirect effects are presented in Tables 3 and 4 in phenotypic and genotypic levels, respectively.

4.1. *Direct and indirect effects*

4.1.1. *At phenotypic level*

Direct effect of plant height on yield per plant was positive (0.0534). Positive and indirect effects through petiole length (0.0114), leaf area index (0.0222), corm breadth (0.0103), cormel weight (0.0114), cormel number (0.0292). Direct effect of petiole length on yield per plant was positive (0.1907). This positive direct effect together with positive and indirect effects through leaf area index (0.0113), corm breadth (0.0115) and cormel weight (0.0108) mobilized the correlation high and positive (r_p= 0.063). Direct effect of petiole breadth on yield per plant was positive (0.0282). Positive and indirect effects also exhibited via petiole length (0.0118), leaf area index (0.0544) and cormel weight (0.0146). Direct effect of leaf length on yield per plant was (0.0257). Positive and indirect effects were found through petiole length (0.0109), leaf area index (0.0234), corm breadth

(0.0122) and cormel weight (0.0114). r_p of leaf breadth with yield per plant was also positive but low (0.058). But its direct effect on yield per plant was negative (-0.3024) and high in magnitude. The phenotypic indirect and positive effect was found via petiole length (0.1039), leaf area index (0.0222) and corm breadth (0.0107). r_p of leaf area index with yield per plant was insignificant and positive (0.574).Leaf area index had positive and direct contribution (0.4182) to yield per plant phenotypically. Positive and indirect effect exhibit through corm breadth (0.0130) and cormel weight (0.0111). r_p of corm length with yield per plant was insignificant and positive (0.080). It showed positive and direct effect on yield per plant (0.0127). Positive and indirect effects were observed through petiole length (0.0101), leaf area index (0.0134), corm breadth (0.0155) and cormel weight (0.0157).Phenotypic correlation of corm breadth with yield per plant was moderate and positive (0.292). Its direct effect on yield per plant was positive (0.2061). It showed positive indirect effects via petiole length (0.0107), leaf area index (0.0263) and cormel weight (0.0169). r_p of corm weight with yield per plant was insignificant and positive (0.179). It showed direct effect on yield per plant was positive (0.0762). As direct effect was positive but very low in magnitude the phenotypic correlation was also depended on the positive and indirect effects through petiole length (0.0116), leaf area index (0.0171), corm breadth (0.0167) and cormel weight (0.0552). Phenotypic correlation with yield per plant was positive (0.269). Its direct effects on the end product were positive (0.1455). Positive direct effect together with low and positive indirect effect through cormel number (0.0818) mobilized the correlation coefficient as positive.

Table 3. Direct (diagonal bold) and indirect effects for yield and yield contributing characters of elephant yam (*A. campanulatus*.Bl.) in phenotypic level.

Character	PLH	PEL	PEB	LAI	CRL	CRB	CRW	COW	CON	COL	COB	r_p with YPP
PLH	0.0534	0.0114	0.0010	0.0222	0.0007	0.0103	0.0046	0.0114	0.0292	0.0036	0.0000	0.064
PEL	0.0032	0.1907	0.0018	0.0113	0.0007	0.0115	0.0046	0.0108	-0.0788	0.0039	0.0001	0.063
PEB	0.0020	0.0118	0.0282	0.0544	0.0007	0.0078	0.0043	0.0146	-0.0251	0.0039	0.0001	0.065
LAI	0.0028	0.0051	0.0037	0.4182	0.0050	0.0130	0.0031	0.0111	-0.0454	0.0078	0.0000	0.574*
CRL	0.0028	0.0101	0.0016	0.0134	0.0127	0.0155	0.0058	0.0157	-0.0167	0.0028	0.0033	0.080
CRB	0.0026	0.0107	0.0011	0.0263	0.0005	0.2061	0.0062	0.0169	0.0066	0.0027	0.0001	0.292
CRW	0.0032	0.0116	0.0016	0.0171	0.0010	0.0167	0.0762	0.0552	0.0042	0.0034	0.0001	0.179
COW	0.0003	0.0010	0.0002	0.0017	0.0001	0.0013	0.0017	0.1455	0.0818	-0.0347	0.0002	0.269
CON	-0.0026	-0.0025	-0.0012	0.0318	0.0004	0.0153	0.0069	0.0001	0.5968	-0.0009	0.0000	0.624**
COL	0.0029	0.0111	0.0017	0.0205	0.0004	0.0082	0.0040	0.0112	-0.0776	0.0656	0.0001	0.053
COB	0.0021	0.0105	0.0017	0.0197	0.0009	0.0101	0.0048	0.0015	0.0209	0.0058	**0.0012**	0.075

Residual effect = 0.2055; * Significant at 0.05 level; ** Significant at 0.01 level.

Correlation between cormel number and yield per plant was also highly significant and positive (r_p = 0.0.624). Its direct effect on yield per plant was positive (0.5968). But this direct effect was little bit reduced by the negative indirect effects. It showed positive indirect effects through leaf breadth (0.0148), leaf area index (0.0318) and corm breadth

(0.0153). Direct effect of cormel length on yield per plant was positive (0.0656). Positive but indirect effects were found via petiole length (0.0111), leaf area index (0.0205) and cormel weight (0.0112). Direct effect of cormel breadth on yield per plant was positive at phenotypic level (0.0012). It showed positive indirect effects through leaf area index (0.0197) and corm breadth (0.0101).

4.1.2. *At genotypic level*

Plant height showed positive direct effect on yield per plant (0.0227). But these positive indirect effects were cancelled to some extent by the negative indirect effects through cormel number (-0.0315). Direct and together with indirect effects make the correlation is equal (r_g= 0.057). Direct effect of petiole length with yield per plant was negative (-0.0129). Petiole breadth showed positive and direct effect on yield per plant (0.0077). Leaf length showed positive direct effect (0.0383) on yield per plant. Direct effect of leaf breadth with yield per plant was positive (0.0601). Genotypic correlation of leaf area index with yield per plant was positive (0.051). Positive and direct effect of leaf area index on yield per plant was found (0.0470). Genotypic correlation of corm length with yield per plant was low and positive (0.041). Negative and direct effect of corm length was found on yield per plant (-0.0748). Positive and indirect effects were also found through cormel number (0.0365), cormel length (0.0146).Corm breadth exhibited negative direct effect on yield per plant (-0.0203). Corm weight exhibited negative direct effect on yield per plant (-0.0586). It also showed positive and indirect effects through cormel number (0.0177). r_g of cormel number with yield per plant was low and positive and significant (0.486). But its direct influence on yield per plant was positive and high (0.5527). Cormel length registered the positive direct effect on yield per plant (0.0375). Cormel breadth showed direct and positive effect on yield per plant (0.0037).

Table 4. Direct (diagonal) and indirect effects for yield and yield contributing characters of elephant foot yam (*A. campanulatus* Bl.) in genotypic level.

Character	PLH	PEL	PEB	LAI	CRL	CRB	CRW	COW	CON	COL	COB	r_p with YPP
PLH	0.0227	-0.0007	0.0006	0.0025	-0.0037	-0.0006	-0.0032	0.0000	-0.0315	0.0018	0.0002	0.057
PEL	0.0012	-0.0129	0.0004	0.0011	-0.0040	-0.0012	-0.0032	0.0000	-0.0004	0.0020	-0.0002	0.055
PEB	0.0017	-0.0007	0.0077	0.0020	-0.0039	-0.0101	-0.0036	-0.0001	-0.0321	-0.0009	0.0002	0.066
LAI	0.0012	-0.0003	0.0003	0.0470	-0.0028	-0.0008	-0.0024	0.0000	-0.0304	-0.0018	0.0002	0.051
CRL	0.0011	-0.0007	0.0004	-0.0010	-0.0748	-0.0008	-0.0246	-0.0001	0.0365	0.0146	0.0001	0.041
CRB	0.0007	-0.0007	0.0038	0.0018	-0.0030	-0.0203	-0.0022	0.0000	0.0061	0.0015	0.0002	0.065
CRW	0.0012	-0.0007	0.0005	0.0019	-0.0031	-0.0007	-0.0586	0.0002	0.0177	0.0019	0.0002	0.003
COW	0.0001	0.000	0.0000	0.0001	-0.0005	0.0000	0.0009	-0.0113	-0.0044	0.0006	0.0000	-0.006
CON	-0.0013	0.0000	-0.0004	-0.0026	-0.0049	-0.0002	-0.0019	0.0001	0.5527	-0.0020	-0.0002	0.486*
COL	0.0011	-0.0007	-0.0002	-0.0023	-0.0292	-0.0008	-0.0030	-0.0002	-0.0298	0.0375	0.0004	0.050
COB	0.0012	0.0008	0.0003	0.0023	-0.0030	-0.0009	-0.0028	0.0000	-0.0282	0.0039	0.0037	0.046

Residual effect = 0.207; * Significant at 0.05 level; ** Significant at 0.01 level.

Work done in ref. [23] on seven agronomic traits like plant leafiness, number of tubers per hills and tuber yield in yellow yam showed positive and highly significant correlation of tuber yield with plant, leafiness, shoot height and vine dry weight. High positive correlation between plant height and size of corms, L/B ratio and size of corm in taro were observed at genotypic level [24]. The characters showed mean weight of cormels/plant, number of cormels /plant and leaf area index were positively and significantly correlated with yield [25]. In 31 genotypes of taro [26], eight yields contributed characters that were significantly and positively correlated with yield per plant at both phenotypic and genotypic levels. Cormel yield had positive and significant association with the length and girth of main sucker, number of cormels per plant and corm weight but it was negatively correlated with corm/cormel ratio which were observed in a correlation study for thirty genotypes of taro [27]. The characters cormel number, cormel thickness, plant height, leaf length and leaf width had higher positive correlation with cormel yield whereas leaf number was negatively correlated with yield [28]. In arvi total yield per plant was positively and significantly correlated with number of corms and cormels per plant and corm length [29]. In thirty accessions of taro (*Colocasia esculenta* L) plant height, petiole length, corm breadth, cormel number, cormel length exhibited direct effect on yield per plant at the genotypic level. Cormel weight and cormel breadth had the highest direct effect on yield per plant at the phenotypic level. The residual effect was 0.3043 at the genotypic level and that at phenotypic level was 0.4874 [30]. The nature and extent of correlation and path coefficients of aqua edible aroid taro accessions were studied for different characters. The yield per plant showed significant and positive phenotypic correlation with petiole length, leaf length, leaf breadth, leaf number, inflorescence length, spath length and spath breadth. The residual effect was 0.2205 which indicated that characters studied contributed 78% of yield per plant. At genotypic level, yield per plant indicated positive and significant correlation with plant height and leaf number. The residual effect (0.424) indicated that about 58% yield was contributed by these characters [31]. Studies on the nature and extent of variability of *Colocasia esculenta* (L.) Schott. revealed significant differences and wide range of variations among the accessions. Genotypic variances and coefficient of variation for most of the characters were remarkably higher than their corresponding variances due to environment which also indicate the existence of variation in genotypic origin. Plant height, petiole length, leaf length, each stolon weight, total stolon weight, stolon length and corm length expressed high heritability with moderate to high genetic advance signaled heritable in nature [32]. Genetic parameters for yield and its components were studied in 315 genotypes of cocoyam. Genotypic variances and coefficient of variation for most of the characters were remarkably higher than their corresponding environmental variances, which also indicate the existence of variation in genotypic level. Plant height, petiole length, leaf length, leaf breadth for cocoyam expressed high heritability with moderate to high genetic advance signalled heritable in nature. High heritability with high genetic advance in percentage of mean was also observed for plant height, petiole length, petiole breadth, leaf breadth, leaf number, LAI, corm length, corm weight, cormel weight in cocoyam [33].

5. Conclusion

High heritability with high genetic advance in percentage of mean was observed for all characters. In the correlation study plant height, leaf length, leaf breadth, LAI, corm length, corm breadth, corm weight, cormel number, cormel length, cormel breath showed positive correlation with yield per plant in genotypic and phenotypic level. LAI, cormel number in phenotypically and cormel number in genotypic level showed relatively high positive direct effect on yield per plant. The residual effects were 0.207 so that nearly 80% yield per plant was contributed by these characters in phenotypic and genotypic level. Correlation among different characters could be effectively utilized in the selection of better plant type. Path coefficient analysis provides an effective tool in finding out the direct and indirect contribution of different contributing characters towards yield.

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