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Genetic variability of nalkachu genotypes

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ABSTRACT
Work were characterized for genetic variability of nalkachu genotypes in a trial grown in randomized block design with three replications during rabi season 2014-2015 at AAU, Jorhat. Analysis of variance revealed that genotypes differed significantly for all the quantitative traits under study. Both genetic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were high for number of stolons per plot and caudex yield (t/ha), while it was moderate for plant height (cm). A heritability (%h^2) value exceeding 90 Per cent was observed for petiole height, number of stolons per plot, caudex weight (g/plant), length of stolons (cm), caudex yield (t/ha), starch(mg/100g), crude fibre (%), while it was low for plant diameter (cm). Expected genetic advance as per cent of mean (G_s %) was highest for number of stolons per plot, while low for leaf lamina (cm). Among the biochemical traits, calcium (%) showed high percentage of GCV and PCV. The value of h^2 exceeding 90 per cent was observed for starch (mg/100g) and crude fibre (%). High heritability with high genetic advance were observed in caudex length (cm), number of stolons per plot, length of stolon (cm), weight of stolons (g/plot), stolon yield (t/ha), caudex yield(t/ha). Among the genotypes, the genotype BCKVST-14 had the highest stolon yield (16.62t/ha) which was followed by BCKVST-13 (15.52t/ha). Among the genotypes, the genotype AAUST-2 had the highest caudex yield (24.63t/ha) which was followed by AAUST-1 (24.32t/ha). Association studies at both phenotypic and genotypic levels revealed significant to highly significant correlation of stolon yield with stolon length, stolon diameter (at both phenotypic and genotypic levels). Positive and significant correlation of stolon yield with stolon length .At genotypic level caudex yield was positive and significant correlation with plant height. However, association of caudex yield with stolon yield was significantly negatively correlated.
Key words *: Genetic variability, Heritability,Colocasia esculenta, Genetic advance, Caudex, Stolon.*

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INTRODUCTION

Nalkachu (*Colocasia esculenta* var. *stolonifera*) is one of the important tuber crops of Assam. Unlike other upland colocasia cultivars, nalkachu is grown for stolon as well as caudex. It is also cultivated in West Bengal and Bangladesh. It is a highly nutritious tuber crop, which contains good amount of starch, calcium, iron, β-carotene, vitamin B1 and vitamin-C.

Plants are generally grouped by their relationship to one another based on their similarities and differences, which is based on the characters they possess. This study, therefore, supplied additional morphological information which might be helpful in resolving the on going controversy in the taxonomy of *Colocasia,* which would in turn, probably lead to possible delimitation of *C. esculenta* (Ezeabara *et al.,* 2015).

The information helps in giving proper weightage to various traits during selection or other breeding programme so that the improvement of desirable traits could be achieved effectively (Panwar *et al.,* 2012). Also the success of any breeding programme largely depends on extent of genetic variability present in the population. Overall variation is required to be partitioned into heritable and non-heritable components for the estimation of genetic parameters such as genotypic and phenotypic coefficients of variation, heritability and expected genetic advance (Ariyo, 1987).

Wide variation among cultivated types of taro have been noticed in N.E region with low yields and the availability of vegetable in summer is limited and nalkachu being available throughout the season in one

or other form of vegetable has a great scope for its commercial exploitation and also it has an immerse potential and a good future as they also provide raw materials for convenience foods (flour), animal feeds and commodity chemicals like starch, vitamin C, protein etc.

Materials of the study:

The materials for the present investigation comprised of 13 cultivars of *Colocasia esculenta* var. *stolonifera* collected from different parts of North eastern regions of the country.

List of genotypes with its place of collection

Genotypes	Source
Manipur black, Manipur green	Manipur
BCKVST-1, BCKVST-3, BCKVST-5, BCKVST-13, BCKVST-14	West Bengal
Tezpur, Bholakachu, Hybrid, Karimganj, Karimganj pink, Bilachipara black	Assam

Statistical analysis of data

Analysis of variance of RBD

The data were subjected to the analysis of variance for Randomized Block Design as suggested by Panse and Sukhatme (1985). Partitioning the total variance into replications and treatments represented the expectations of the variance and the appropriate degrees of freedom in each case.

Genotypic and phenotypic variance

The genotypic and phenotypic variance was computed based on the expected mean sum of squares as follows.

Phenotypic variance = $\sigma^2 p = \sigma^2 g + \sigma^2 e$

Coefficient of variation

Genotypic and phenotypic coefficient of variations were computed according to Burton and De Vane (1953) based on the estimate of genotypic and phenotypic variance as follows:

$$GCV = \frac{\sqrt{GV}}{\overline{X}} x100$$

The ranges of PCV and GCV were classified as suggested by Sivasubramanian and Menon (1973) and are given below

0-10 %	:	Low
10-20 %	:	Moderate
20 % and above	:	High

Heritability in broad sense (h^2)

The range of heritability in broad sense was classified as suggested by Johnson *et al*. (1955).

Less than 30 %	:	Low
30-60 %	:	Moderate
More than 60 %	:	High

Genetic advance (GA)

Genetic advance is the expected genetic gain of superior individual under certain amount of selection pressure. Genetic advance for each character was worked out by adopting the formula given by Johnson *et al*. (1955).

$GA = K \times \sigma p \times h^2 (b)$

Genetic advance as per cent mean was categorized as given below as suggested by Johnson *et al.* (1955).

0- 10% - Low 10.1-20% - Moderate >20.1% - High

Correlation coefficient analysis

Correlation coefficient analysis reveals the association of characters i.e., a change in one character brought about by a change in the other character. Phenotypic and genotypic correlation coefficients between different variables were calculated by using covariance technique (Al-Jibouri *et al*., 1958). To determine the degree of association of characters with yield and also among the yield components, the correlation coefficients were calculated.Significance of correlation coefficients was tested by comparing phenotypic correlation coefficients with the table values (Fisher and Yates, 1967) at (n-2) degrees of freedom at 5 % and 1% level where 'n' denotes the total number of pairs of observations used in the calculation.

RESULTS :

Genetic variability

The simple measure of variability like mean, range and the major components of variability such as phenotypic and genotypic coefficients of variation (PCV and GCV), heritability in broad sense (h^2), genetic advance and genetic advance as per cent of mean were presented in Table 1. All the nineteen characters under study exhibited high variability as evident from the estimates of mean, range, coefficients of variation, heritability and genetic advance.

The study revealed that PCV was higher than the corresponding GCV for all the characters indicating that all characters had interacted with environment to some degree. High PCV and GCV were recorded for traits *viz*., caudex length(cm), number of stolen per plot, length of stolons(cm), weight of stolons(g), stolen yield(t/ha), caudex yield(t/ha), starch(mg/100g), calcium(%), iron(mg/100g), crude fibre(%), oxalate content(%), indicating the existence of wider genetic variability for these traits in the genotypes under study. On the other side, PCV and GCV estimates were low for traits *viz.,* leaf lamina(cm) and suggesting narrow range of genetic variability for these traits.The other characters *viz*.,plant height (cm), plant span(cm), plant diameter(cm), petiole height(cm), diameter of stolen(cm) were found with moderate variability.

High heritability coupled with high genetic advance as per cent of mean indicatesoperation of additive gene action which was observed in characters *viz.,*plant height (cm), plant span(cm), petiole height(cm), caudex length(cm), number of stolen per plot, length of stolen (cm), weight of stolons (g), stolon yield (t/ha), caudex yield (t/ha), starch(mg/100g), calcium(%), iron(mg/100g), crude fibre(%), oxalate content (%). Hence, direct selection for these traits in genetically diverse material could be effective for desired genetic improvement. Moderate genetic advance as per cent of mean with high or moderate heritability suggests the action of both additive and non-additive gene action there by favorable influence of environment in the expression of the traits. The same was reported in case of plant diameter, number of leaves, leaf lamina.

Table 1. Estimates of genetic parameters for different morphological traits in nalkachu genotypes

Sl. No.	Character	Range		Mean	Variance		PCV (%)	GCV (%)	h^2 (%)	Genetic Advance	GA as percent of mean
		Min	Max		Phenotypic	Genotypic					
1	Plant height (cm)	93.92	119.54	106.79	63.67	44.32	27.47	26.23	69.00	11.44	48.71
2	Plant span (cm)	64.85	90.12	77.61	86.96	67.09	12.02	10.55	77.00	14.82	19.09
3	Diameter (cm)	21.93	35.09	29.32	22.01	10.69	16.00	11.15	48.00	4.69	16.01
4	LL/wd ratio	1.54	1.89	1.68	0.02	0.01	7.58	5.51	69.00	0.13	8.26
5	Petiole height (cm)	61.86	92.15	73.13	91.98	90.69	13.11	13.02	98.00	19.47	26.63
6	Number of leaves	5.33	7.66	6.66	0.71	0.39	12.67	9.41	55.00	0.95	14.38
7	Caudex weight (g)	313.69	423.23	358.64	1407.50	1397.71	10.46	10.42	99.00	76.74	21.39
8	Caudex length (cm)	62.16	127.13	92.13	495.49	488.13	24.16	23.98	98.00	45.17	49.03
9	Starch (mg/100g)	5.56	10.40	7.82	2.61	2.49	20.68	20.20	95.00	3.17	40.63
10	Calcium (%)	0.33	0.95	0.68	0.04	0.04	29.27	28.79	60.00	0.39	58.34
11	Iron (mg/100g)	4.71	9.65	6.23	2.46	2.12	25.19	23.36	85.00	2.78	44.61
12	Crude fibre (%)	4.45	8.85	6.29	1.99	1.85	22.43	21.61	92.00	2.70	42.90
13	Oxalate content (%)	0.05	0.13	0.09	0.00	0.00	27.98	25.57	73.00	0.04	48.12

14	Number of stolons per plot	86.33	253.00	150.11	2726.49	2704.56	34.71	34.57	99.00	70.92	106.69
15	Length of stolons (cm)	62.16	127.13	92.13	495.49	488.43	24.16	23.98	98.00	45.17	49.03
16	Girth of stolons (cm)	0.49	0.86	0.67	0.01	0.01	17.41	15.33	77.00	0.18	27.81
17	Weight of stolon (g)	33.22	67.91	47.52	181.65	162.27	28.36	26.80	89.00	24.80	52.18
18	Stolon yield (t/ha)	9.32	16.62	12.03	6.83	6.75	21.72	21.58	98.00	5.31	44.18
19	Caudex yield (t/ha)	10.43	24.63	16.98	30.35	30.01	32.44	32.26	98.00	11.22	66.08

LL = Leaf length; WD= Leaf width. *= Significant at 5% probability level

= Significant at 1% probability level *= Significant at 1% and 5% probability level

Correlation coefficient analysis

The phenotypic (P) and genotypic (G) correlation coefficients were worked out for nineteen characters in Nalkachu and the results are presented in Table 4.11. In general, it was observed that genotypic correlation coefficients were higher than that of phenotypic correlation coefficients. This could be interpreted on the basis that there was a strong inherent genotypic relationship between the characters studied, but their phenotypic expression was impeded by the influence of environmental factors.

Table 2 revealed that stolon yield (t/ha) had significant positive correlation with length of stolons, number of stolons per plot, diameter of stolonand caudex length at phenotypic level. Significant negative correlation of stolon yield (t/ha) at genotypic level was registered with caudex yield (-0.7462), caudex weight (-0.3553), starch (-0.0256), crude fibre (-0.2197), plant diameter (-0.065), petiole height (-0.030), plant span (-0.294), plant height has significant positive correlation with stolon yield and caudex yield (t/ha) both at genotypic and phenotypic level.

At genotypic level, number of stolon per plot exhibited significant positive correlation with stolon length, stolon diameter, caudex length, and caudex weight.Negative correlation of number of stolons per plot at genotypic level was registered with caudex yield (-0.4516). Length of stolon, had significant positive correlation with caudex length and caudex weightand biochemical characters like calcium, iron, crude fibre. Significant negative correlation of length of stolons was registered with caudex yield (-0.2105).

At phenotypic level, caudex length exhibited significant positive correlation with number of stolons per plot, length of stolon, starch, crude fibre, calcium, iron oxalate.Significant negative correlation of length of caudex was registered with caudex yield (-0.2206).However, association of caudex yield with number of stolons per plot was negatively correlated but significant.

At both genotypic and phenotypic level number of stolons per plot exhibited significant positive correlation with stolon length, stolon diameter, stolon weight, caudex length, caudex weight.But significant negative correlation with caudex yield.

The results on character association indicated significant positive association of number of leaves, caudex length(cm), number of stolen per plot, weight of stolons(g/plot), length of stolen(cm), starch(mg/100g), calcium(%), iron(mg/100g), crude fibre(%), oxalate content(%), stolen yield(t/ha) which indicated that the adequate knowledge of positive interrelationship between caudex yieldand its components themselves is useful for selection and improvement in these characters simultaneously improves number of stolonsper plant. However, associationof caudex yield with number of stolons per plot was significantly negatively correlated.

Table .2 **Phenotypic (below diagonal) and genotypic (above diagonal)correlation co efficient of qualitative and quantitative characters**

Character	Plant height (cm)	Plant Span (cm)	Diameter of Plant (cm0	LL/WD ratio n (cm)	Petiole height (cm)	No. of Leaves	Caudex weight (g)	Caudex length (cm)	Starch (mg/100g)	Calcium (%)	Iron (mg/100g)	Crude fibre (%)	Oxalate (%)	No. of stolons per plot	Length of stolons (cm)	Diameter of stolons (cm)	Weight of stolons (g)	Stolon yield (t/ha)	Caudex yield (t/ha)
Plant height (cm)		0.8651*	0.8564*	0.9268*	0.8159*	0.6982*	0.577*	0.6625*	0.6099*	0.5057*	0.7*	0.5461*	0.522*	0.5624*	0.6695*	0.755*	0.3298*	0.1239*	0.4148*
Plant span (cm)	0.6559**		1.0097*	0.7876*	0.7832*	0.6009*	0.6173*	0.2688*	0.5853*	0.3307*	0.58*	0.6951*	0.3286*	0.1058*	0.2751*	0.4259*	-0.1424	-0.2943	0.669*
Diamete	0.573	0.542		1.1539*	1.0688*	1.019*	0.8916	0.6461*	0.9355*	0.8512	0.9257*	0.9689	0.7864	0.3982	0.6515*	0.8825*	0.1509*	-0.0	0.6654

r of plant (cm)	6**	**		*	*	*	*			*		*	*	*				652	*
LL/W D ratio (cm)	0.4672**	0.5969**	0.5801**		1.0323*	0.9383*	0.7167*	0.8084*	0.9025*	0.8712*	1.0112*	1.055*	0.9042*	0.52*	0.8134*	0.8946*	0.3552*	0.0312	0.4468*
Petiole height (cm)	0.6896**	0.6824**	0.7306**	0.7380**		0.9839*	0.8173*	0.6587*	0.91*	0.7977*	0.9145*	0.9098*	0.7333*	0.4393*	0.6589*	0.7981*	0.1905*	-0.0308	0.5082*
No. Of leaves	0.4053*	0.4483**	0.3742*	0.5123**	0.7510**		0.7978*	0.6955*	1.0434**	0.8238*	0.9161*	0.907*	0.7206*	0.5039*	0.6749*	0.7354*	0.2396*	0.0891	0.3906*
Caudex weight (g)	0.4654**	0.5437**	0.6091**	0.5277**	0.8091**	0.5942**		0.2746*	0.8892*	0.5948*	0.6069*	0.7352*	0.6538*	0.0226	0.2781	0.4221	-0.1995	-0.3553	0.7721*
Caudex length (cm)	0.5556**	0.2228	0.4683**	0.5677**	0.6511**	0.4993**	0.2725		0.5856*	0.7917*	0.807*	0.5839*	0.6845*	0.9235*	1.0011*	0.9355*	0.8585*	0.6667*	-0.2206
Starch (mg/100g)	0.5184**	0.4702**	0.6574**	0.6318**	0.8908**	0.7388**	0.8636**	0.5684**		0.845*	0.8084*	0.8884*	0.8198*	0.3423*	0.581*	0.6514*	0.1265	-0.0256	0.5305*
Calcium (%)	0.3750*	0.2942	0.5732**	0.6757**	0.7814**	0.6301**	0.5841**	0.7790**	0.8163**		0.8565*	0.8489*	0.8268*	0.5656*	0.7873*	0.8375*	0.4331*	0.2628*	0.1325
Iron (mg/100g)	0.5504**	0.5422**	0.6419**	0.8248**	0.8382**	0.6035**	0.5624**	0.7238**	0.7422**	0.7826**		0.9035*	0.795*	0.5947*	0.8016*	0.8996*	0.4226*	0.171	0.2197*
Crude fibre (%)	0.5037**	0.6078**	0.7085**	0.7432**	0.8653**	0.6366**	0.7003**	0.5590**	0.8170**	0.7866**	0.8395**		0.7778*	0.2884*	0.5838*	0.622*	0.1328*	-0.1173	0.4734
Oxalate (%)	0.4142**	0.2894	0.5662**	0.6515**	0.6624**	0.4775**	0.5921**	0.6300**	0.7483**	0.7504**	0.7035**	0.7157**		0.4852*	0.6895*	0.6846*	0.4172*	0.1944	0.3312*
No.of stolons per plot	0.4702**	0.103	0.2796	0.3869*	0.4291**	0.3683*	0.0236	0.9123**	0.3310*	0.5508**	0.5519**	0.2749	0.4436**		0.9209*	0.857*	0.939*	0.8652*	-0.4516*
Length of stolons (cm)	0.5657**	0.2348	0.4799**	0.5763**	0.6496**	0.5065**	0.2755	0.9963**	0.5712**	0.7708**	0.7333**	0.5616**	0.6471**	0.9123**		0.9298*	0.8612*	0.6635*	-0.2105
Diameter of stolons (cm)	0.5758**	0.3293*	0.4721**	0.5689**	0.6957**	0.5435**	0.3621*	0.8170**	0.5624**	0.7251**	0.7247**	0.5362**	0.4833**	0.7462**	0.8187**		0.6611*	0.500*	-0.0755
Weight of stolons (g)	0.2755	-0.136	0.1115	0.2693	0.1738	0.1306	-0.1914	0.8171**	0.1187	0.4075*	0.3701*	0.141	0.4227**	0.8800**	0.8208**	00.5424**		0.919*	-0.6051*
Stolon yield (ton/ha)	0.1019	-0.2666	-0.0422	0.0131	-0.0327	0.0825	-0.3514*	0.6562***	-0.027	0.2509	0.1464	-0.1141	0.1731	0.8605***	0.6555***	00.4580**	0.8521***		-0.7462*
Caudex yield (ton/ha)	0.3448*	0.5817**	0.4499**	0.3001	0.5069**	0.3038	0.7619**	-0.2166	0.5210**	0.1318	0.2008	0.4554**	0.3094	-0.4515**	-0.2064	-0.065	-0.5668**	-0.7401**	

LL = Leaf length ; WD= Leaf width.

*= Significant at 5% probability level

= Significant at 1% probability level *= Significant at 1% and 5% probability level

DISCUSSION

The success of any breeding programme depends on the availability of genetic variability present in the population, which is however, not directly measurable by itself, but has to be inferred with the phenotypic expression. The phenotype may therefore be defined as a linear function of genotype (G) and environment (E) and genotype (G) × environment (E) interaction effect.

Thirteen genotypes under evaluation exhibited significant differences for all the nineteen characters studied and wide range of variability was observed for number of stolons per plot, stolon length, stolon diameter, caudex length, caudex yield, stolon yield indicating the scope for selection of suitable initial breeding material for further improvement. These results are similar with the findings of Paul *et al.* (2011) and Pandey *et al.* (1996). Cheema *etal.*and Paul and Bari (2012), also studied genetic variability for yield and qualitative traits in colocasia.

Among the growth attributes, genetic variability studies showed the moderate values of PCV and GCV values for plant height,plant diameter, petiole height, number of leaves, suggesting moderate range of genetic variability and considerable influence of environment in the expression of the trait. High heritability coupled with high genetic advance as per cent of mean was observed for this trait which indicated the preponderance of additive gene action governing the inheritance of this character and offers the best possibility of improvement of plant height through simple selection procedures. Similar results expressed by Paul *et al.* (2011) and Pandey *et al*. (1996). And Paul and Bari (2012), studied the high potentiality of the genetic variability as experienced by character is main concern of the breeder and magnitude can be measured from genetic variability.

Among the yield and yield attributes, genetic variability studies showed the higher values of PCV and GCV values were high for number of stolon per plot, length of stolons, weight of stolons, caudex length, stolon yield and caudex yield. indicating that a high degree of genetic variability is present in these characters which provides a greater scope for selection. Similar observations have been recorded by Paul *et al.* (2011) and Chand *et al.* (1987), Dwivedi and Sen (1999) in *Colocasia*.

Among the biochemical attributes, genetic variability studies showed the higher value of PCV and GCV values for starch, calcium, iron, crude fibreand oxalate content, indicating that a degree of genetic variability is present in these characters which provides a greater scope for selection. Similar observations have been recorded Paul *et al*. (2010), Pandey *et al.* (1996) and Mitra*et al.* (2015) studied the germplasm of the upland taro.

All the growth, yield and yield attributes, and biochemical attributes except leaf lamina showed moderate to high PCV and GCV values along with the minimum difference between PCV and GCV values suggesting high degree of genetic variability for these characters and offering a greater scope for effective selection as these characters are less influenced by the environment. Supporting results observed by Akwee*et al*. (2015), Paul and Bari (2013), Mukherjee *et al.* (2016) and Cheema *et al.* (2007) who studied genetic variability for yield and quality traits in colocasia.

High heritability coupled with high genetic advance as per cent of mean indicates operation of additive gene action which was observed in characters *viz.,* plant height (cm), plant span (cm), petiole height (cm), caudex length (cm), number of stolen per plot, length of stolen (cm), weight of stolons (g), stolen yield (t/ha), caudex yield (t/ha), starch (mg/100g), calcium (%), iron (mg/100g), crude fibre (%), oxalate content (%). Hence, directional selection for these traits in genetically diverse material which could be effective for desired genetic improvement. Moderate genetic advance as per cent of mean with high or moderate heritability suggests the action of both additive and non-additive genes there by favorable influence of environment in the expression of the traits. Similar observations have been recorded by Akwee*et al*.(2015) and Mukherjee *et al.* (2016). Paul *et al.* (2011) reported that wide range of variation observed among the genotypes.

Correlation coefficient analysis

Yield, being a complex character is governed by a large number of genes. The influence of each character on yield could be known through correlation studies with a view to determine the extent and nature of relationships prevailing among yield and yield attributing characters. The present investigation was carried out to study the association of different characters on yield and yield attributing traits in nalkachu both at phenotypic and genotypic levels. In general, it is evident from the data recorded that genotypic correlation was higher than phenotypic correlation indicating strong inherent association of characters, and a less influence of environmental factors and relative stability of the genotypes.

The data revealed that stolon yield had significant positive correlation with length of stolons, number of stolons per plot, diameter of stolonand caudex length at phenotypic level. Significant negative correlation of stolon yield at genotypic level was registered with caudex yield (-0.7462), caudex weight (-0.3553), starch (-0.0256), crude fibre (-0.2197), plant diameter (-0.065), petiole height (-0.030), plant span (-0.294), plant height has significant positive correlation with stolon yield and caudex yield per ha both at

genotypic and phenotypic level which supported results observed by Paul *et al.*(2013).Beyene*et al.* (2013) and Mukherjee *et al*. (2016) reported about the association of yield and stolon characters, stolon number, positively and correlated with caudex length at both genotypic and phenotypic level.

At genotypic level, number of stolon per plot exhibited significant positive correlation with stolon length, stolon diameter, caudex length, and caudex weight. Negative correlation of number of stolons per plot at genotypic level was registered with caudex yield (-0.4516). Length of stolon, had significant positive correlation with caudex length and caudex weightand biochemical characters like calcium, iron, crudefibre. Significant negative correlation of length of stolons was registered with caudex yield (-0.2105). Supporting results were observed by Akwee*et al*. (2015), Chinelo*et al.* (2015), Paul and Bari (2012),Mukherjee *et al.* (2016)and Paul *et al.* (2013).

At phenotypic level, caudex length exhibited significant positive correlation with number of stolons per plot, length of stolon, starch, crude fibre, calcium, iron oxalate. Significant negative correlation of length of caudex was registered with caudex yield (-0.2206). Supporting results were observed by Mukherjee *et al*.(2016), Mitra*et al*.(2015) and Paul and Bari (2012).

At both genotypic and phenotypic level number of stolons per plot exhibited significant positive correlation with stolon length, stolon diameter, stolon weight, caudex length and caudex weight.But significant negative correlation was observed with caudex yield. Supporting results were observed by Mukherjee *et al*.(2016), Beyene*et al*.(2013) and Paul *et., al* (2013), reported that corm breadth showed significant positive correlation with yield per plant.

The results on character association indicated significant positive association of number of leaves, caudex length (cm), number of stolen per plot, weight of stolons (g/plot), length of stolen(cm), starch (mg/100g), calcium (%), iron (mg/100g), crude fibre (%), oxalate content (%), stolen yield (t/ha) which indicated that the adequate knowledge ofpositive interrelationship between caudex yield and its components themselves is useful for selection and improvement in these characters which simultaneously improves number of stolons per plant.However, association of caudex yield with number of stolons per plot was negatively correlated but significant. Supporting results were observed by Mukherjee *et al*. (2016), Paul and Bari (2013), and Beyene*et al*. (2013), reported that number of stolons has direct effect on caudex yield

CONCLUSION

The findings of the present investigation justified possibility of commercial cultivation of nalkachu for growing in the subtropical high humid high rainfall climate of Assam. Based on the performance for growth, yield and biochemical characters, Bholakachu followed by Tezpur and BCKVST-14, offered as best genotypes of the Assam.

The present investigation further generatedsome useful information on the extent of genetic variation for quantitative growth, yield and biochemical characters as well as character association and causal relationship at genotypic level which could help to formulate effective selection criteria for genetic improvement of nalkachu to develop novel and improved nalkachu cultivars.

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