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Short communication

Variability and character associationship study in colocasia

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Colocasia is grown as staple or subsistence crop throughout the tropics and sub-tropics. It is one of the vegetables which most extensively consumed by the low income group in the rural areas. Information regarding variability and character association studies in colocasia germplasm is lacking. Hence, the present by evaluating investigation was undertaken for such studies 25 clonal collections.

The experiment was conducted under the agro climatic condition of Horticulture Experimental Farm, Division of Horticulture, ICAR Research Complex for NEH Region, Umiam, Meghalaya during 2004 and 2005. Twenty colocasia germplasm, *viz*., Meghalaya Collection-1, BCC-1, BCC-2, C-137, ML-1, ML-2, ML-9, Muktakeshi, Nainital, Kadma Local, BK Col-1, Nadia Local and C-3 collected from ICAR Complex, Umiam, Meghalaya; AR Col-5, AR Col-6, AR Col-7 and AR Col-8 collected from ICAR, Arunachal Pradesh Centre, Basar; AS Col-1 and AS Col-2 collected from Jorhat, Assam and Panchmukhi collected from NBPGR Regional Station, Umiam, Meghalaya were grown in a randomized block design in three replications. Individual plot size was 2.4 m × 2.25 m and a spacing of 60 cm × 45 cm was followed. All the recommended cultivation practices were followed to raise a good crop. The yield attributing parameters were recorded on randomly selected five plants in each replication and the yield was recorded on per plot basis. The mean data was subjected for analysis of variance as per the formula given by Panse and Sukhatme (7). Genotypic and phenotypic correlation and their coefficient of variations were computed as per formula suggested by Miller *et al*. (4), while path coefficient analysis was done as per Wright (13), and Dewey and Lu (1).

The data presented in Table 1 showed highly significant differences among the germplasm for different traits and exhibited higher range of variation. The variations were high for characters like plant height (47.30 to 96.60 cm), number of leaves per plant (6.20 to 21.80), leaf area (302.43 to 841.81 cm^2), moisture content of cormels (46.01 to 85.99 %), number of cormels per plant (2.67 to 10.27), weight of corms per plant (94.00 to 440.00 g), weight of cormels per plant (101.00 to 338.00 g) and yield per hectare (106.30 to 259.81 q). Phenotypic coefficient of variance was higher than genotypic coefficient of variance for all the characters studied. Almost all the characters showed high heritability which indicates that characters are least influenced by the environmental effects. Heritability ranged from 22.10% (moisture content of petioles) to 98.77% (moisture content of cormels). In the present study, most of the characters showed high genetic advance that reveals that the traits are governed by additive genes and selection will be useful for improvement of these traits. Genetic advance was ranged from 2.81 (moisture content of petioles) to 101.17 (weight of corms per plant).

Table 2 reveales that yield was positively and significantly correlated with weight of corms per plant (0.918). Plant height was positively and significantly associated with leaf area (0.875) and leaf area index (0.868) while it had negative and significant association with weight of cormels per plant (-0.636), and number of cormels per plant (-0.603). Significant and positive correlation of number of leaves per plant was observed with number of suckers per plant (0.992). Number of suckers per plant had positive non-significant correlation with yield (0.248). Leaf area was positively and significantly associated with leaf area index (1.000) and weight of corms per plant (0.659). Again leaf area index was also positively and significantly associated with weight of corms per plant (0.687). Roychowdhury (11) also observed association of leaf area index with yield of colocasia. Nigam and Choubey (5) also studied correlation between leaf area index and yield. Positive correlation of weight of corms per plant and number of cormels per plant with yield was reported by Parthasarathy and Medhi (87). Moisture content of leaves had positive and significant correlation with moisture content of petioles (0.802) and weight of cormels per plant (0.879). Moisture content of cormels had positive correlation with yield (0.442). Positive association of number of corms per plant was observed with weight of corms per plant (0.207) and yield (0.302). Number of cormels per plant was positively and significantly correlated with weight

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Table 1. Character with high genotypic coefficient of variance, heritability and genetic advance.

Character	Range	Phenotypic coefficient of variance (PCV%)	Genotypic coefficient of variance (GCV%)	Heritability (Broad sense) (%)	Genetic advance as per cent of mean
Plant height (cm)	47.30-96.60	20.84	20.44	96.24	41.31
Number of leaves/plant	6.20-21.80	26.75	25.95	94.13	51.87
Number of suckers / plant	1.40-6.60	29.26	28.55	95.23	57.40
Leaf area (cm^2)	302.43-841.81	33.50	33.29	98.76	68.16
Leaf area index	0.11-0.31	32.96	32.40	96.59	65.59
Moisture content of leaves (%)	71.54-88.17	5.52	3.72	45.33	5.16
Moisture content of petioles (%)	70.85-94.24	6.17	2.90	22.10	2.81
Moisture content of cormels (%)	46.01-85.99	14.96	14.87	98.77	30.44
Number of corms/plant	1.07-2.13	19.74	18.25	85.47	34.75
Number of cormels/plant	2.67-10.27	29.00	27.91	92.60	55.32
Weight of corms/plant (g)	94.00-440.00	50.94	50.02	96.41	101.17
Weight of cormels / plant (g)	101.00-338.00	28.49	26.24	84.84	49.79
Yield (q/ha)	106.30-259.81	24.77	23.97	93.60	47.77

of cormels per plant (0.925). Weight of cormels per plant was also positively correlated with yield (0.134). The present investigation revealed that genotypic correlation coefficients was higher than phenotypic correlation coefficients for yield and yield contributing characters revealing that there was strong association between these two characters genetically.

Data presented in Table 3 revealed that leaf area had the highest positive direct effect (8.884) on yield followed by weight of corms per plant (8.861), weight of cormels per plant (8.079) and number of suckers per plant (0.264). Similar finding was also reported by Pandey *et al.* (6), Rodriquez *et al.* (10), Velayudhan *et al.* (12), Dwivedi and Sen (2), and Pillai *et al.* (9) in taro. Ghodake *et al.* (3) had also observed that the number of suckers/plant had the highest positive direct effect on cormel yield. Therefore, attention should be paid on selection based on these traits for total tuber yield improvement in colocasia.

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Table 2. Prominent character association amongst different traits in colocassia.

Trait		Plant height (cm)	Number of leaves/ plant	Number of suck-ers/ plant	Leaf area (cm^2)	Leaf area index	Moisture content of leaves (%)	Moisture content of petioles (%)	Moisture content of cormels (%)	Number of corms/ plant	Number of cormels/ plant	Weight of corms/ plant (g)	Weight of cormels/ plant (g)	Yield (q/ ha)
Plant height (cm)	G		0.407	0.343	0.875**	0.868**	-0.417	-0.604*	0.275	0.018	-0.603*	0.514	-0.636*	0.281
	P		0.383	0.326	0.849**	0.835**	-0.284	-0.288	0.265	0.004	-0.584*	0.497	-0.596*	0.278
Number of leaves/ plant	G			0.992**	0.274	0.261	0.048	-0.771**	0.127	0.285	0.229	0.412	0.243	0.457
	P			0.940**	0.272	0.264	-0.010	-0.300	0.123	0.247	0.218	0.391	0.260	0.426
Number of suckers / plant	G				0.247	0.230	0.030	-0.769**	0.085	0.180	0.177	0.222	0.293	0.248
	P				0.240	0.223	0.004	-0.313	0.083	0.177	0.179	0.213	0.273	0.240
Leaf area (cm^2)	G					1.000**	-0.385	-0.386	0.223	-0.113	-0.402	0.659*	-0.597*	0.378
	P					0.995**	-0.234	-0.164	0.218	-0.103	-0.389	0.644*	-0.540	0.363
Leaf area index	G						-0.420	-0.413	0.245	-0.114	-0.416	0.687**	-0.619*	0.411
	P						-0.255	-0.171	0.233	-0.111	0.400	0.668*	-0.552	0.392
Moisture content of leaves (%)	G							0.802**	0.498	0.696**	0.709**	-0.085	0.879**	0.305
	P							0.837**	0.312	0.413	0.477	-0.059	0.534	0.200
Moisture content of petioles (%)	G								0.199	0.754**	0.674*	0.131	0.631*	0.545
	P								0.095	0.336	0.281	0.056	0.290	0.233
Moisture content of cormels (%)	G									-0.104	-0.201	0.271	-0.173	0.442
	P									-0.094	-0.187	0.263	-0.151	0.419
Number of corms/ plant	G										0.467	0.207	0.542	0.302
	P										0.437	0.189	0.497	0.279
Number of cormels/ plant	G											-0.025	0.925**	0.198
	P											-0.005	0.874**	0.186
Weight of corms/ plant (g)	G												-0.249	0.918**
	P												-0.201	0.875**
Weight of cormels/ plant (g)	G													0.134
	P													0.127

Table 3. Prominent direct effects of different traits on yield.

Trait	Plant height (cm)	Number of leaves/ plant	Number of suck-ers/ plant	Leaf area (cm^2)	Leaf area index	Moisture content of leaves (%)	Moisture content of petioles (%)	Moisture content of cormels (%)	Num-ber of corms/ plant	Num-ber of cormels/ plant	Weight of corms/ plant (g)	Weight of cormels/ plant (g)
Plant height (cm)	4.760	1.939	1.631	4.164	4.132	-1.984	-2.877	1.310	0.083	-2.868	2.447	-3.029
Number of leaves/plant	-1.608	-3.946	-3.915	-1.083	-1.028	-0.188	3.041	-0.501	-1.123	-0.905	-1.626	-0.960
Number of suckers / plant	0.090	0.262	0.264	0.065	0.061	0.008	-0.203	0.023	0.048	0.047	0.059	0.077
Leaf area (cm^2)	-0.774	-0.243	-0.219	8.884	8.886	0.340	0.341	-0.198	0.100	0.355	-0.583	0.528
Leaf area index	-1.226	-0.368	-0.326	3.415	3.413	0.593	0.583	-0.345	0.161	0.588	-0.970	0.874
Moisture content of leaves (%)	0.346	-0.040	-0.025	0.319	0.348	-0.830	-2.324	-0.413	-0.577	-0.588	0.071	-0.729
Moisture content of petioles (%)	0.306	0.391	0.390	0.195	0.209	-1.420	-0.507	-0.101	-0.382	-0.341	-0.066	-0.320
Moisture content of cormels (%)	0.087	0.040	0.027	0.071	0.078	0.158	0.063	0.317	-0.033	-0.064	0.086	-0.055
Number of corms/plant	-0.035	-0.569	-0.361	0.226	0.228	-1.391	-1.508	0.208	-1.999	-0.933	-0.413	-1.084
Number of cormels/plant	1.490	-0.567	-0.438	0.993	1.028	-1.754	-1.666	0.497	-1.154	-2.472	0.061	-2.288
Weight of corms/plant (g)	1.985	1.591	0.856	2.545	2.651	-0.329	0.506	1.047	0.797	-0.095	8.861	-0.960
Weight of cormels/plant (g)	-5.141	1.966	2.363	-4.819	-4.997	7.101	5.096	-1.400	4.381	7.475	-2.008	8.079
Total direct and indirect effects	0.281	0.457	0.248	0.378	0.411	0.305	0.545	0.442	0.302	0.198	0.918	0.134
Genotypic correlation with yield	0.281	0.457	0.248	0.378	0.411	0.305	0.545	0.442	0.302	0.198	0.918	0.134

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