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Short Communication

EVALUATION OF SOME DASHEEN TYPE COLOCASIA (*Colocasia esculenta* var. *esculenta*) UNDER BIHAR PLATEAU REGION

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A collection of 30 accessions of less diversified group of Dasheen type Colocasia (*Colocasia esculenta* var. *esculenta*) have been made from fourteen different locations of the country and were evaluated under field trial for growth, tuber yield with its attributes and qualitative parameters during *kharif* seasons of 1994, 1995 and 1996. Wide variations in plant height, leaf length/breadth ratio, sheath length, tuber yield, dry matter(%), digestible starch content (%), protein content (%), oxalate content (%) and in organoleptic test were observed. On the basis of tuber yield and qualitative aspects, three distinct types viz. E.Ac.-1, E.Ac.-20 and E.Ac.-26 were identified for commercial cultivation for this region. These could also be utilized as donor germplasm in crop improvement.

Key words : Dasheen, *Colocasia esculenta* var. *esculenta*, evaluation, characterization

Dasheen type colocasia is an important tuber crop used as vegetable in southern part of Bihar. This clonally propagated crop (through tubers) comes under less diversified group of tuber crops, and is less exploited for improvement, inspite of its high yielding ability. Hence, the collected germplasm were evaluated to identify promising lines for crop improvement.

Thirty Dasheen type colocasia germplasm collections from fourteen different locations of the country (Table 1) were evaluated at Department of Horticulture, Birsa Agricultural University, Ranchi during *kharif* seasons of 1994, 1995 and 1996. For evaluation seed materials (side tubers/cut tubers) of each accession was planted in 25-30 cm deep trenches spaced at 75cm with 60cm space between plant to plant within the rows in a plot size of 3m × 2m. Each plot accommodated 20 plants. The experiments were laid out in Randomized Block Design with three replications. The required package of practices were followed for each treatment with an uniform fertilizer dose of 120 kg N: 80 kg P_2O_5 : 100 kg K_2O with 20 t of FYM per hectare basis were applied during growing seasons each year. Observations on growth attributes viz., plant height (cm), number of leaves, number of tillers/suckers per plant, petiole length (cm), sheath length(cm), leaf length and breadth (cm); yield and its attributes viz., tuber yield (t/ha), corm and cormel length and width (cm) as well as weight (g) and number of cormels were recorded. For qualitative aspects the observations recorded included dry matter on oven dry basis, starch content (Dubios *et al.*, 1956), oxalate content, protein content (Mahadevan and Sridhar, 1986) alongwith organoleptic taste for cooking quality on 10 point scale.

Among the growth parameters (Table 2a), wide range of variation were shown by accessions.

Table 1. Passport data for *Colocasia esculenta* var. *esculenta* germplasm collections

Entry No.	Local/ Common Name	Source/Place of procurement		
		Village/Block	District	State/UT
E.Ac.-1	Sarukanda	Hocher	Ranchi	Bihar
E.Ac.-2	Manasaru	Aiginia	Bhubaneswar	Orissa
E.Ac.-3	Bhanda	Aiginia	Bhubaneswar	Orissa
E.Ac.-4	CV-9	Barapani	Bhubaneswar	Meghalaya
E.Ac.-5	CV-11	Barapani	Bhubaneswar	Meghalaya
E.Ac.-6	-	Barapani	Bhubaneswar	Meghalaya
E.Ac.-7	Noya Bunglow	Jorhat	Bhubaneswar	Assam
E.Ac.-8	Kanda	Jorhat	Bhubaneswar	Assam
E.Ac.-9	C-3	Jorhat	Bhubaneswar	Assam
E.Ac.-10	Assam long	Jorhat	Bhubaneswar	Assam
E.Ac.-11	Borkatchu	Jorhat	Bhubaneswar	Assam
E.Ac.-12	J.C.C-25	Jorhat	Bhubaneswar	Assam
E.Ac.-13	Kachalu	Katra	Jammu	J&K
E.Ac.-14	Kachalu	Katra	Jammu	J&K
E.Ac.-15	Ratalu	Kumharwand	Jagdalpur	Madhya Pradesh
E.Ac.-16	Ratalu	Kumharwand	Jagdalpur	Madhya Pradesh
E.Ac.-17	Kanda	Pali	Patna	Bihar
E.Ac.-18	Sarukanda	Gola	Hazarbiagh	Bihar
E.Ac.-19	Sarukanda	-	Ganjam	Orissa
E.Ac.-20	Hathpanja	Kanke	Ranchi	Bihar
E.Ac.-21	C-71	Barapani	Ranchi	Meghalaya
E.Ac.-22	TVM-293	Barapani	Ranchi	Meghalaya
E.Ac.-23	ML-3	Barapani	Ranchi	Meghalaya
E.Ac.-24	ML-8	Barapani	Ranchi	Meghalaya
E.Ac.-25	Kanda	Mathwalia	Bhojpur	Bihar
E.Ac.-26	Kanda	Sukurhuttu	Ranchi	Bihar
E.Ac.-27	Banda-1	Kumarganj	Faizabad	Uttar Pradesh
E.Ac.-28	Banda-2	Kumarganj	Faizabad	Uttar Pradesh
E.Ac.-29	Banda-3	Kumarganj	Faizabad	Uttar Pradesh
E.Ac.30	Banda-4	Kumarganj	Faizabad	Uttar Pradesh

E.Ac.-15 recorded the tallest plants of 147.00 cm height followed by E.Ac.-2 (136.00 cm) and E.Ac.-22 (129.33 cm), respectively while the shortest plants were observed in E.Ac.11 (61.00 cm). Very less variations were observed in case of number of leaves (4.73 to 7.73) but the number of tillers per plant varied in an drastically in most of the accessions in the range of 0.86

Table 2a. Pooled performance (1994-1996) of 30 accessions of *Colocasia esculenta* var. *esculenta* for growth characters

Entries	Plant height (cm)	No. of leaves/ plant	No. of tillers/ plant	Petiole length (cm)	Sheath length (cm)	Petiole/ sheath length ratio	Leaf length (cm)	Leaf breadth (cm)	Leaf length/ breadh ratio
E.Ac.-1	69.50	6.16	3.03	56.47	29.00	1.94:1	45.13	29.67	1.52:1
E.Ac.-2	136.00	7.13	6.13	129.33	58.33	2.21:1	51.33	39.13	1.31:1
E.Ac.-3	108.07	6.67	2.73	93.13	48.67	1.91:1	71.33	36.13	1.85:1
E.Ac.-4	107.67	4.77	3.67	81.40	45.67	1.78:1	60.33	45.60	1.32:1
E.Ac.-5	85.33	5.20	1.47	73.07	32.67	2.23:1	44.93	29.73	1.51:1
E.Ac.-6	76.67	6.33	2.47	68.07	33.00	2.06:1	45.67	33.93	1.35:1
E.Ac.-7	81.67	6.13	4.03	77.00	47.00	1.64:1	54.67	38.00	1.43:1
E.Ac.-8	90.33	7.40	1.80	83.07	36.00	2.31:1	48.00	30.93	1.55:1
E.Ac.-9	77.67	4.73	1.80	63.33	29.00	2.18:1	49.67	32.07	1.55:1
E.Ac.-10	82.33	5.67	2.20	71.73	35.67	2.01:1	46.33	29.73	1.56:1
E.Ac.-11	61.00	5.10	2.50	55.33	29.67	1.86:1	44.73	28.73	1.56:1
E.Ac.-12	102.33	6.20	2.40	51.20	28.67	1.79:1	43.33	29.33	1.46:1
E.Ac.-13	62.67	5.73	3.20	91.33	40.67	2.25:1	46.60	29.67	1.57:1
E.Ac.-14	113.00	5.03	1.73	98.93	45.33	2.18:1	50.67	34.93	1.45:1
E.Ac.-15	147.00	5.03	3.03	70.27	37.00	1.90:1	37.53	29.47	1.27:1
E.Ac.-16	66.00	4.93	0.86	53.80	29.00	1.86:1	50.07	29.40	1.70:1
E.Ac.-17	83.67	5.27	3.10	72.40	27.00	2.68:1	43.40	28.60	1.52:1
E.Ac.-18	78.67	5.33	2.23	69.27	31.67	2.19:1	43.00	24.87	1.73:1
E.Ac.-19	70.67	7.73	1.33	62.73	28.67	2.19:1	43.33	29.13	1.49:1
E-Ac.-20	70.67	6.10	5.73	59.00	26.00	2.27:1	47.07	34.13	1.38:1
E.Ac.-21	90.67	6.33	2.70	80.00	41.00	1.95:1	44.07	33.80	1.30:1
E.Ac.-22	129.33	6.40	1.57	103.87	47.67	2.18:1	55.00	39.47	1.38:1
E.Ac.-23	96.67	5.00	1.30	82.87	43.67	1.90:1	38.13	29.33	1.30:1
E.Ac.-24	81.67	6.10	2.13	68.67	27.67	2.48:1	46.87	30.40	1.54:1
E.Ac.-25	90.33	7.37	3.60	87.27	33.33	2.62:1	45.60	32.40	1.41:1
E.Ac.-26	85.33	4.77	2.60	71.60	39-00	1.84:1	64.27	45.53	1,41:1
E.Ac.-27	90.67	5.46	1.73	54.20	28.67	1.89:1	59.07	41.20	1.43:1
E.Ac.-28	80.26	5.83	1.07	68.87	34.33	2.01:1	42.93	25.40	1.69:1
E-Ac.-29	71.60	5.97	1.53	63.33	26.00	2.44:1	31.93	25.47	1.25:1
E.Ac.-30	100.80	6.67	1.73	88.67	29.67	2.99:1	42.06	31.47	1.34:1
Mean	89.61	5.88	2.51	75.01	35.66	-	47.90	32.59	-
Range	61.00-	4.73-	0.86-	51.20-	26.00-	1.78:1-	31.93-	24.87-	1.25:1-
	147.00	7.73	6.13	129.33	58-33	2.99:1	71.33	46.60	1.85
CD (0.05)	27.08	1.21	0.98	23.16	14.16	-	6.69	5.42	

Table 2b. Pooled performance (I 9S4-1996) of 30 accessions of *Colocasia esculenta* var. *esculenta* for tuber yield and its attributes

Entries No.	Corn length (cm)	Corn width (cm)	Corn weight (g)	No. of cormels/ plant	Wt. of cormel/plant (g)	Tuber yield/plant (g)	Tuber yield/plot (kg)	Tuber yield (t/ha)
E.Ac.-l	17.93	7.27	720.00	12.47	669.66	1389.66	21.30	23.66
E.Ac.-2	19.40	5.67	550.00	5.33	399.33	949.33	16.73	18.59
E.Ac.-3	17.40	6.07	710.00	8.00	125.00	835.00	14.20	16.15
E.Ac.-4	17.73	10.07	432.00	9.00	95.00	527.00	8.03	8.92
E.Ac.-5	15.73	5.43	606.67	9.67	156.66	663.33	10.78	11.98
E.Ac.-6	15.33	10.73	670.00	6.80	130.00	800.00	15.30	17.00
E.Ac.-7	14.87	5.20	393.33	11.33	486.66	879.99	15.17	14.17
E.Ac.-8	17.07	5.40	343.33	8.73	156.66	499.99	7.27	8.08
E.Ac.-9	16.40	5.27	350.00	7.00	126.66	476.66	7.63	8.48
E.Ac.- 10	11.90	6.20	270.00	7.00	313.33	583.33	9.21	10.23
E.Ac.- 11	6.47	5.33	186.67	12.80	316.66	503.33	7.05	7.84
E.Ac.- 12	11.33	6.13	360.00	13.47	291.66	651.66	14.00	15.56
E.Ac.-13	15.17	6.27	486.67	7.60	180.00	666.67	10.40	11.56
E.Ac.- 1 4	11.60	5.77	300.00	8.07	162.66	462.66	7.84	8.71
E.Ac.-15	16.73	6.47	352.67	5.47	173.33	526.00	8.82	9.80
E.Ac.-16	14.73	5.47	239.33	6.93	261.66	500.99	8.48	9.42
E.Ac.- 17	17.77	4.87	306.67	5.07	200.00	506.67	8.48	9.42
E.Ac.- 18	19.33	6.40	150.00	0.40	70.00	220.00	3.71	4.12
E.Ac.- 19	20.80	7.13	566.67	7.53	136.66	703.33	11.60	12.89
E.Ac.-20	30.00	7.27	721.33	1.61	286.33	1006.66	19.77	21.97
E.Ac.-21	15.33	5.73	376.67	9.67	266.66	643.33	9.15	10.17
E.Ac.-22	10.73	10.83	660.00	2.06	73.53	735.53	10.15	11.28
E.Ac.-23	17.13	6.80	266.66	5.13	196.66	463.32	7.25	8.06
E.Ac.-24	14.47	5.20	433.33	8.20	150.00	583.33	8.85	9.83
E.Ac.-25	13.00	7.80	570.00	7.60	373.33	943.33	15.55	17.28
E.Ac.-26	17.87	7.27	725.00	9.53	433.33	1158.33	19.12	21.25
E.Ac.-27	15.33	6.87	430.00	8.40	209.33	639.33	10.90	12.11
E-Ac.-28	14.33	5.93	590.00	6.40	118.33	708.33	11.85	13.17
E.Ac.-29	15.53	4.73	385.00	3.40	236.66	621.66	10.60	11.78
E.Ac.-30	16.33	7.00	636.67	5.73	225.00	861.67	13.20	14.67
Mean	16.59	6.65	456.29	7.33	233.99	690.28	11.413	12.61
Range	6.47	4.73	150.00-	0.40-	70.00-	220.00-	3.71-	4.12-
	30.00	10.83	725.00	12.47	669.66	1389.66	21.300	23.66
CD (0.05)	3.56	2.11	145.34	5.02	162.82	284.91	4.41	5.11

in E.Ac.-16 to 6.13 in E.Ac.-2. The petiole length measurement ranged from 51.20 cm in E.Ac.-12 to 129.33 cm in E.Ac.-2. Maximum sheath length was recorded in E.Ac.-2 (58.33 cm) and minimum as 26.00 cm in case of two accessions viz. E.Ac.-20 and E.Ac.-29. Seven accessions viz. E.Ac.-2, E.Ac.-12, E.Ac.-21, E.Ac.-22, E.Ac.-23, E.Ac.-25 and E.Ac.-30 were observed to have plant height and petiole length more than 100cm. Sheath length measured was found independent of the petiole length which showed existence of genetic differences among the accessions. Leaf length was recorded maximum in E.Ac.-3 (71.33cm) followed by E.Ac.-26 (64.27cm) and E.Ac.-4 (60.33cm) respectively. The range of leaf breadth varied from 24.87cm in E.Ac.-18 to 45.60 cm in E.Ac.-4. The ratio of petiole length and sheath length ranged from 1.78:1 (E.Ac.-4) to 2.99:1 (E.Ac.-30) while that of leaf length/breadth ratio found to vary from 1.25:1 (E.Ac.-29) to 1.85:1 (E.Ac.-3).

Wide range of variation were found yield attributing characters and tuber yield (Table 2b). The length of corm varied from 6.47 cm in E.Ac.-11 to 30.00 cm in E.Ac.-20 which was followed by E.Ac.- 19 (20.80cm) and E.Ac.-2 (19.40 cm) respectively. E.Ac.-22 recorded the maximum corm width (10.83cm) while other accessions like E.Ac.-6 (10.73cm) and E.Ac.-4 (10.07 cm) ranked second and third in order. Corm with minimum width was observed in E.Ac.-29 (4.73 cm). Weight of the main corm varied from 150.00g in E.Ac.-18 to 725.00g in E.Ac.-26. E.Ac.-26 recorded to have heaviest main corm of 725.00g which closely followed by the entries E.Ac.-20 and E.Ac.-1 having corm weight of 721.33 g and 720.00g respectively. Number of cormels per plant varied from 0.04 in E.Ac.-18 to 13.47 in Ac.-12 which is in agreement with the reports of existence of less number of cormels in Dasheen type (Plucknett, 1983). Weight of cormels per plant ranged from 70.00g (E.Ac.-18) to 669.66g (E.Ac.-1). Tuber yield per plant was recorded maximum in E.Ac.-1 (1389.66g) followed by the accessions E.Ac.-20 (1006.66g) and E.Ac.-26 (1158.33g). The minimum tuber yield per plant was recorded in E.Ac.-18 (220-00g). The estimated tuber yield was maximum in E.Ac.-1 (23.66 t/ha) which was closely followed by the accessions E.Ac.-20 (21.97 t/ha) and E.Ac.-26 (21.25 t/ha) respectively.

Among quality characteristics dry matter percentage determined by oven dry basis was maximum as 25.46 per cent in E.Ac.-17 which was closely followed by E.Ac.-22 (25.42%) and E.Ac.-4 (25.38%) respectively. Drymatter production percentage was recorded minimum in E.Ac.-19 (22.14%). Colocasia in general is also good source of digestible starch (Onwume, 1978). Starch content was estimated to be high in accessions viz. E.Ac.-17 (19.60%), E.Ac.-2 (19.40%), E.Ac.-3 (19.40%) etc. while the minimum value was observed in E.Ac.20 (13.20%). The factor that limits the intake of colocasia tuber as food is the acridity caused by the presence of oxalate content which in this case varied from 0.34 per cent (E.Ac.-14) to 0.69 per cent (E.Ac.-8). Cooking quality adjudged by organoleptic taste having 10 point scale revealed that accessions E.Ac.-23 (9.0), E.Ac.-29 (9.0), E.Ac.-22 (8.8), E.Ac.-13 (8.6), E.Ac.-20 (8.6), E.Ac.-28 (8.6), E.Ac.-1 (8.4) and E.Ac.-12 (8.4) showed their superiority.

Oxalate content value (Table 2c) when compared with tuber yield of corresponding accession, showed that accessions which were having low oxalate content were mostly low yielders but among the high yielding accessions viz. E.Ac.-1, E.Ac.-20, E.Ac.-26 with oxalate content 0.62, 0.48, 0.48 per cent are easily digestible with good taste after cooking. So these high yielding accessions could be selected for further breeding improvement programme of this crop.

Table 2c. Pooled performance (1994-1996) of 30 accessions of *Colocasia esculenta* var. esculenta for quality characters

Entries No.	Drymatter (%)	Starch (%)	Oxalate (%)	Protein (%)	Organolepti c taste score(0-10)
E.Ac.-1	24.24	18.5	0.62	2.62	8.4
E.Ac.-2	25.18	19.4	0.49	1.26	5.6
E.Ac.-3	22.78	19.4	0.52	1.96	6.8
E.Ac.-4	25.38	19.0	0.41	0.98	8.2
E.Ac.-6	23.44	16.7	0.58	1.72	7.6
E.Ac.-6	23.66	16.8	0.42	0.72	4.4
E.Ac.-7	25.46	16.0	0.56	2.86	7.4
E.Ac.-8	24.66	16.4	0.69	2.54	6.2
E.Ac.-9	23.72	16.8	0.61	2.14	4.6
E.Ac.-10	24.46	14.2	0.62	2.12	2.8
E.Ac.-11	25.26	18.6	0.62	1.78	3.6
E.Ac.-12	23.88	15.4	0.46	1.08	8.4
E.Ac.-13	22.46	14.4	0.48	1.12	8.6
E.Ac.-14	22.84	15.2	0.34	1.28	8.2
E-Ac.-15	25.18	19.4	0.53	0.96	9.0
E.Ac.-16	24.82	19.2	0.38	0.92	8.4
E.Ac.-17	25.46	19.6	0.51	1.12	7.8
E.Ac.- 1 8	23.83	18,5	0.63	2.16	4.8
E.Ac.-19	22.14	14.4	0.46	0.98	3.8
E.Ac.-20	22.82	13.2	0.48	1.76	8.6
E.Ac.-21	22.56	13.6	0.42	0.88	6.4
E.Ac.-22	25.42	15.4	0.56	1.06	8.8
E.Ac.-23	23.28	14.8	0.68	1.92	9.0
E.Ac.-24	25.32	18.6	0.62	1.18	6.4
E.Ac.-25	24.32	17.4	0.63	1.82	6.8
E.Ac.-26	23.18	18.2	0.48	1.06	4.8
E.Ac.-27	23.22	16.4	0.49	0.86	6.6
E.Ac.-28	22.36	16.4	0.39	1.08	8.6
E.Ac.-29	24.46	17.6	0.52	1.24	9.0
E.Ac.-30	23.62	15.2	0.61	1.74	6.8
Mean	23.99	16.82	0.53	1.51	—

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