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Assessment of herbage yield potential in different colocasia (*Colocasia esculenta* L.) Genotypes under konkan region

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Abstract

The field experiment was carried out at the Central Experiment Station, Wakawali, Dapoli during *kharif* season of the year, 2016 to assess the yield potential of green leaves (herbage) of colocasia. In all sixteen genotypes were assessed for their herbage yield potential at 45, 60 and 75 days after planting. All the genotypes showed wide range of variation. The genotype M-9-111 (G₁₀) consistently gave the highest herbage at every harvest (Cumulative herbage yield 10.26 t ha⁻¹). The lowest herbage yield (5.87 t ha⁻¹) was recorded in Devkibai Walanga genotype. The maximum quantity of leaves was harvested in second harvest (60 DAP) and afterward the yield level was declined in all the genotypes except Sree Pallavi, NDB-22 and Khopoli where the yield was increased in third harvest (75 DAP).

Keywords: Colocasia, genotypes and herbage yield

Introduction

Colocasia (*Colocasia esculenta* L. Schott) also known as 'edode' or 'arvi' is a tropical tuber crop belongs to the monocotyledonous family 'Araceae' of the order Arales whose members are known as 'aroids' (Van Wyk, 2005) [5]. Colocasia is believed to have originated in South Central Asia, perhaps in Eastern India or Malaysia (Watt, 1989) [6]. Colocasia is a rich source of starch and reasonably good source of major components of the diet viz., proteins, minerals and vitamins. All parts of the plant including corm, cormels, rhizome, stalk, leaves and flowers are edible and contain abundant starch (Bose *et al.* 2003) [11]. It is well adapted to shade and can withstand drought to a great extent. The crop is found to thrive well in acidic as well as alkaline soils. Colocasia is one of the tuber crops mainly grown for leafy vegetable under Konkan during *kharif* season. Among the essential amino acids (those cannot be synthesized in the human body), phenylalanine and leucine are relatively abundant in colocasia.

However, so far not much work towards development of high yielding suitable types has been done in this crop. Hence, it was felt necessary to undertake well planned research work to evaluate the genotypes of colocasia for assessing their potential for herbage yield as a leafy vegetable under hot and humid climate of Konkan region.

Materials and methods

The experiment was carried out during the period of June to November, 2016 (Kharif season crop) at "Central Experiment Station, Wakawali, Dist. Ratnagiri, Maharashtra falls under tropical humid zone with an average rainfall of 3000 mm is situated at an altitude of 242 m above MSL. The geographical situation is 17° 48' N latitude and 73° 78' E longitude. The experiment was laid out in Randomized Block Design with 16 treatments (genotypes) in 3 replications. Each plot was measured in 1.35 × 1.8 m consisted of three rows with 3 plants per row. Accordingly, 9 plants spaced at 60 × 45 cm apart, were accommodated per plot. The picking of leaves was carried out at 45, 60 and 75 days after planting and weight of harvested leaves from each plant (corm) was recorded as herbage yield. The yield per plot was summing the yield of each plant of that particular plot and the yield per hectare was worked out. The data was statistically analyzed as per the following methods prescribed by Panse and Sukhatme (1985) [4].

Results and discussion

The data on herbage yield (Green leaves) per plant, per plot and per hectare are presented in Table 1, 2 and 3, respectively.

Herbage yield (g plant⁻¹)

The data presented in Table 1 revealed that the colocasia genotypes differed significantly for herbage yield plant⁻¹.

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The genotype M-9-111 was found to be the superior for herbage yield at 45, 60 and 75 DAP i.e. (89.28 g), (94.18 g) and (93.47 g), respectively. Whereas, the lowest herbage yield plant⁻¹ was recorded by Sawantwadi at 45 DAP (53.94 g), Khopoli at 60 DAP (60.69 g) and Devakibai Walanga at 75 DAP (40.47 g).

The cumulative herbage yield upto 75 DAP, indicates that the highest herbage yield plant⁻¹ (276.93 g) was produced in M-9-111 (G₁₀) followed by Sanjivini (G₁) and Sree Pallavi (G₁₁). The variation trend of cumulative herbage in yield plant⁻¹ in different colocasia genotypes is as follows.

G₁₀>G₁>G₁₁>G₄>G₂>G₃>G₁₅>G₁₃>G₁₄>G₁₂>G₉>G₁₆>G₈>G₆>G₇>G₅

Herbage yield (kg plot⁻¹)

The data presented in Table 2 revealed that the colocasia genotypes differed significantly for herbage yield plot⁻¹. The genotype M-9-111 recorded highest herbage yield (2.49 kg plot⁻¹) and the lowest herbage yield plot⁻¹ (1.43 kg) was recorded in Devkibai Walanga (G₅) and Muktakeshi (G₇).

Herbage yield (t ha⁻¹)

Significant differences were observed among all the colocasia genotypes for herbage yield hectare⁻¹ (Table 3 and Figure 2). The genotype M-9-111 recorded the highest herbage yield hectare⁻¹ (10.26 t ha⁻¹) followed by Sanjivini (9.43 t ha⁻¹) and Sree Pallavi (8.77 t ha⁻¹). The lowest herbage yield (5.87 t ha⁻¹) was recorded in Devkibai Walanga followed by Muktakeshi (5.88 t ha⁻¹). The variation in the cumulative herbage yield ha⁻¹ in descending order in different colocasia genotypes is as follows.

G₁₀>G₁>G₁₁>G₄>G₂>G₃>G₁₅>G₁₃>G₁₄>G₁₂>G₉>G₁₆>G₈>G₆>G₇>G₅

The genotype M-9-111 (G₁₀) consistently gave the highest herbage at every harvest. The variation in the herbage yield might be attributed to the vegetative growth (foliage) in different colocasia genotypes and it is a peculiar character especially in tuber crop. Chadha *et al.* (2007) [2] also reported the variation in the morphological characters and yield of colocasia (Toro) Chauhan (2016) [3] observed the variation in the herbage yield of indigenous genotypes of water spinach.

The maximum quantity of leaves was harvested in second harvest (60 DAP) and afterword the yield level was declined in all the genotypes except Sree Pallavi, NDB-22 and Khopoli where the yield was increased in third harvest (75 DAP). Thus, it indicated the wide range of variation in relation to herbage yield per hectare which is the most important qualitative character.

The herbage yield variation among the three pickings (45, 60 and 75 DAP) and genotypes was estimated and presented in Table 4 indicated that there was significant variation in the yield at picking and also in genotype. The variation may be due to disparity of genotypes in foliar development and emergence of new leaves on corm.

Table 1: Herbage yield (g plant⁻¹) of different colocasia genotypes

Genotypes	Herbage yield (g plant ⁻¹)			
	45 DAP	60 DAP	75 DAP	Cumulative
G ₁ Sanjivani	81.66	88.53	84.45	254.63
G ₂ NDB-9	64.92	70.17	69.57	204.65
G ₃ M-12-429	70.14	78.68	52.55	201.37
G ₄ Mahim	70.95	79.68	59.45	210.08
G ₅ Devkibai Walanga	55.47	62.63	40.47	158.57
G ₆ Sawantwadi	53.94	67.00	41.04	161.98
G ₇ Muktakeshi	55.24	62.57	40.84	158.65
G ₈ Kelva	57.03	63.67	42.35	163.06
G ₉ BCC -11	62.50	70.86	49.23	182.59
G ₁₀ M-9-111	89.28	94.18	93.47	276.93
G ₁₁ Sree Pallavi	72.50	80.06	84.26	236.82
G ₁₂ Khed Shiravali	62.31	68.21	55.09	185.61
G ₁₃ Talsure	60.27	67.20	62.28	189.75
G ₁₄ AC -20	60.04	66.31	61.18	187.53
G ₁₅ NDB-22	62.09	64.93	67.78	194.79
G ₁₆ Khopoli	56.81	60.69	64.90	182.39
Mean	64.70	71.58	60.56	196.84
SEm (±)	2.48	2.92	2.89	4.61
CD at 5%	7.18	8.42	8.35	13.31

Table 2: Herbage yield (kg plot⁻¹) of different colocasia genotypes

Genotypes	Herbage yield (kg plot ⁻¹)			
	45 DAP	60 DAP	75 DAP	Cumulative
G ₁ Sanjivani	0.73	0.80	0.76	2.29
G ₂ NDB-9	0.58	0.63	0.63	1.84
G ₃ M-12-429	0.63	0.71	0.47	1.81
G ₄ Mahim	0.64	0.72	0.54	1.89
G ₅ Devkibai Walanga	0.50	0.56	0.36	1.43
G ₆ Sawantwadi	0.49	0.60	0.37	1.46
G ₇ Muktakeshi	0.50	0.56	0.37	1.43
G ₈ Kelva	0.51	0.57	0.38	1.47
G ₉ BCC -11	0.56	0.64	0.44	1.64
G ₁₀ M-9-111	0.80	0.85	0.84	2.49
G ₁₁ Sree Pallavi	0.65	0.72	0.76	2.13
G ₁₂ Khed Shiravali	0.56	0.61	0.50	1.67
G ₁₃ Talsure	0.54	0.60	0.56	1.71
G ₁₄ AC -20	0.54	0.60	0.55	1.69
G ₁₅ NDB-22	0.56	0.58	0.61	1.75
G ₁₆ Khopoli	0.51	0.55	0.58	1.64
Mean	0.58	0.64	0.55	1.77
SEm (±)	0.02	0.03	0.03	0.04
CD at 5%	0.06	0.08	0.08	0.12

Table 3: Herbage yield (t ha⁻¹) of different colocasia genotypes

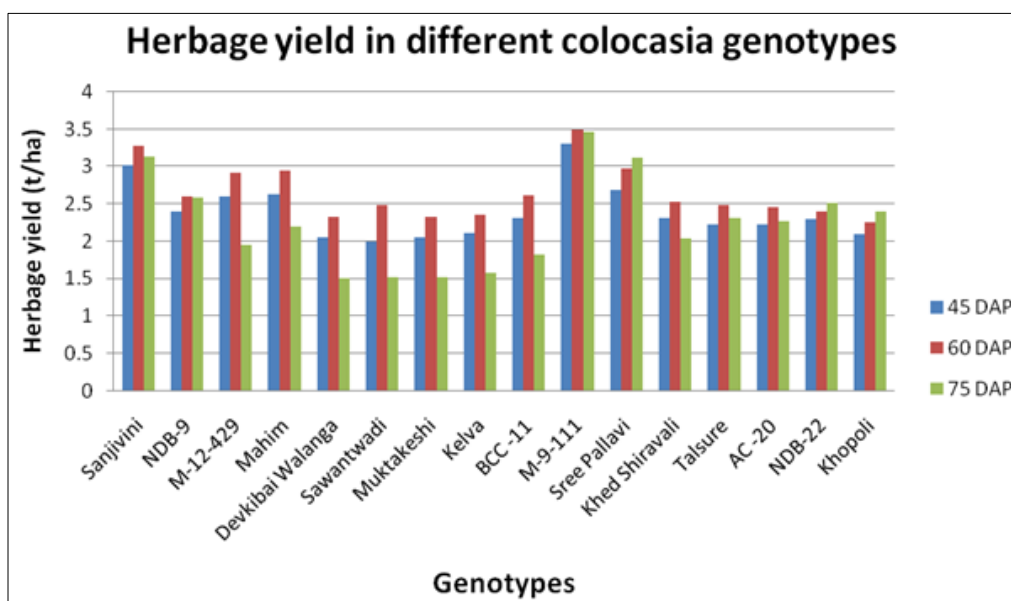
Genotypes	Herbage yield (t ha ⁻¹)			
	45 DAP	60 DAP	75 DAP	Cumulative
G ₁ Sanjivini	3.02	3.28	3.13	9.43
G ₂ NDB-9	2.40	2.60	2.58	7.58
G ₃ M-12-429	2.60	2.91	1.95	7.46
G ₄ Mahim	2.63	2.95	2.20	7.78
G ₅ Devkibai Walanga	2.05	2.32	1.50	5.87
G ₆ Sawantwadi	2.00	2.48	1.52	6.00
G ₇ Muktakeshi	2.05	2.32	1.51	5.88
G ₈ Kelva	2.11	2.36	1.57	6.04
G ₉ BCC -11	2.31	2.62	1.82	6.76
G ₁₀ M-9-111	3.31	3.49	3.46	10.26
G ₁₁ Sree Pallavi	2.69	2.97	3.12	8.77

G ₁₂	Khed Shiravali	2.31	2.53	2.04	6.87
G ₁₃	Talsure	2.23	2.49	2.31	7.03
G ₁₄	AC -20	2.22	2.46	2.27	6.95
G ₁₅	NDB-22	2.30	2.40	2.51	7.21
G ₁₆	Khopoli	2.10	2.25	2.40	6.76
	Mean	2.40	2.65	2.24	7.29
	SEm (±)	0.09	0.11	0.11	0.17
	CD at 5 %	0.27	0.31	0.31	0.49

Table 4: Variation assessment in the herbage yield (t ha⁻¹) of different colocasia genotypes

Summary	Cumulative yield (t ha ⁻¹)	Average yield (t ha ⁻¹)	Variance
Picking time			
45 DAP	38.33	2.40	0.137
60 DAP	42.43	2.65	0.133
75 DAP	35.89	2.24	0.375
Genotypes			
Sanjivini	9.43	3.14	0.017
NDB-9	7.58	2.53	0.012
M-12-429	7.46	2.49	0.240
Mahim	7.78	2.59	0.142
Devkibai Walanga	5.87	1.96	0.175
Sawantwadi	6.00	2.00	0.230
Muktakeshi	5.88	1.96	0.170
Kelva	6.04	2.01	0.163
BCC -11	6.75	2.25	0.163
M-9-111	10.26	3.42	0.009
Sree Pallavi	8.78	2.93	0.048
Khed Shiravali	6.88	2.29	0.060
Talsure	7.03	2.34	0.018
AC -20	6.95	2.32	0.016
NDB-22	7.21	2.40	0.011
Khopoli	6.75	2.25	0.023

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	1.365317	2	0.682658	12.5873*	0.000107	3.31583
Columns	8.048565	15	0.536571	9.893647*	7.78E-08	2.014804
Error	1.627017	30	0.054234			
Total	11.0409	47				

**Fig 1.****Conclusion**

From the results of the present study, it is evident that the colocasia genotypes viz., M-9-111, Sree Pallavi and Sanjivini have performed best in terms of herbage yield and its attributes.

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