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Short Communication

VARIABILITY IN YIELD AND QUALITY CHARACTERS IN TARO (*Colocasia esculenta*)

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Taro (*Colocasia esculenta*) is widely cultivated in the tropics either as a tuber vegetable or as a staple food. The tubers are a good source of starch. The leaves and petioles are used as leafy vegetable, though some types are not used as leafy vegetable because of high acridity caused by Calcium oxalate and glycosides. In India, taro (*C. esculenta*) is popular all over and much variability exists in its forms. At the NBPGR Regional station at Vellanikkara, Trichur (Kerala), 808 samples of cultivated and wild forms of taro were assembled from all over the country. Out of these, 467 accessions were characterised and 57 morphotypes (treated as M1 to M57) were identified (Anon. 1989). These 57 morphotypes comprised 4 distinct groups viz. *C. esculenta* var. *antiquorum* (30), *C. esculenta* var. *esculenta* (13), wild stoloniferous (7) and semi stoloniferous (7). These morphotypes were evaluated for taste, acridity and oxalic acid content.

Quality traits were studied adopting standard procedures. Equal slices of tubers and sections of young petioles and leaves of each representative morphotype were kept in boiling water for 20 minutes, cooled and analysed for acridity and oxalic acid (%). Taste of tuber was marked on 0-9 scale and acridity of tuber leaf and petiole were graded as low, medium and high. Oxalic acid content of tuber flesh was estimated based on the analytical methodology for tuber crops adopted by Central Tuber Crops Research Institute, Trivandrum (Unnikrishnan *et al.*, 1987).

Wide variation in all the characters were observed (Table 1). In the *antiquorum* group, M7, M8 and M27 were better in taste and low in oxalic acid content. Their tubers were not acrid but leaves and petioles were moderately to highly acrid indicating unsuitability for use as green leafy vegetable. M 47 with no acridity in tuber and leaf petiole and low acridity in leaf, appeared to be better. In general, Oxalic acid content was higher in accessions from North-Eastern states. In productivity, M3 (2.45 Kg fresh tuber weight/3 plants) and M7 (2.3 Kg/3 plants) appeared superior.

Among the *esculenta* forms, M20, M 22 and M 29 having very good taste scored over others. M 20 with low oxalic acid and acridity in tuber and leaf and moderate acridity in petiole, was preferable. M 46 and M 50 having good taste and no acridity in tuber and petiole, low or no acridity in leaf and moderate yield, appeared promising.

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Table 1. Variability in yield and quality traits in different morphotypes of taro

Morpho-type	Distribution	Tuber taste (1-9 Scale)	Oxalic acid (%)	Acridity of			Status	Yield of 3 plants (Kg)
				tuber	leaf	petiole		
A. *Antiquorum types*								
1	All over	2	0.170	L	M	M	Cultivar	0.68
2	All over	7	0.095	L	M	M	"	0.82
3	Kerala & Tamil Nadu	5	0.913	A	H	H	"	2.45
4	Himachal Pradesh (North Western Region)	6	0.308	A	M	L	"	1.18
5	North Western Region	6	0.283	L	M	M	"	0.75
6	North Western Region	6	0.164	A	M	M	"	0.50
7	Bihar	8	0.197	A	M	M	"	2.43
8	Kerala, Maharashtra North Eastern Region	8	0.170	A	H	H	"	0.93
9	Kerala & Tamil Nadu	7	0.182	A	H	H	"	0.99
10	Karnataka	3	0.134	H	H	H	"	0.83
12	Kerala & Karnataka	2	0.151	H	H	H	"	0.59
13	Kerala	7	0.182	A	H	H	"	1.10
14	Maharashtra	-	0.063	-	M	M	"	0.90
16	Kerala	2	0.126	M	M	M	Wild type	0.57
27	Kerala, Karnataka	8	0.113	A	H	M	Cultivar	1.08
31	Unknown	7	0.139	L	L	M	"	2.15
37	Kerala	3	-	M	L	L	"	0.30
39	North Eastern Region	7	0.195	A	M	M	"	0.48
40	North Eastern Region	7	0.372	A	M	M	"	1.44
41	North Eastern Region	6	0.687	A	M	M	"	1.60
42	North Eastern Region	1	0.422	L	M	M	"	2.00
43	North Eastern Region	-	0.523	-	L	M	"	1.20
44	North Eastern Region	7	0.378	A	M	L	"	0.65
45	North Eastern Region	6	0.687	A	M	M	"	1.10
47	North Eastern Region	7	0.504	A	L	A	"	1.30
48	North Eastern Region	7	0.832	A	M	L	"	1.70
51	North Eastern Region	7	0.340	A	M	L	"	1.05
53	North Eastern Region	4	0.347	A	M	A	"	0.30
54	North Eastern Region	4	0.536	A	H	M	"	1.65
56	Karnataka	-	0.151	-	M	M	Wild type	0.45

Contd....

Table 1. Contd....

Morpho-type	Distribution	Tuber taste (1-9 Scale)	Oxalic acid (%)	Acridity of			Status	Yield of 3 plants (Kg)
				tuber	leaf	Petiole		
B. *Esculenta types*								
18	Kerala	4	0.107	L	M	A	Cultivar	1.56
19	Kerala	7	0.271	A	L	M	"	1.51
20	Kerala, Karnataka, Tamilnadu	8	0.113	A	L	M	"	1.10
21	Kerala, Himachal Pradesh	7	0.063	A	L	L	"	0.43
22	Kerala	9	0.145	A	H	M	"	0.42
24	Kerala	6	0.095	A	L	L	"	0.71
26	Kerala	1	0.126	A	H	M	"	0.67
29	Karnataka	8	0.088	A	H	M	Wild type	0.65
32	Kerala	7	0.882	A	M	H	"	1.80
38	North Eastern Region	5	0.567	A	L	L	Cultivar	0.60
46	Karnataka	7	-	A	A	A	"	1.62
50	North Eastern Region	6	0.214	A	L	A	"	1.90
52	North Eastern Region	4	0.347	A	M	A	"	0.80
C. *Stoloniferous types*								
17	Kerala, Tamil Nadu	4	6.258	A	M	M	Wild type	0.41
23	Karnataka	8	0.126	A	H	M	"	0.56
28	Kerala	-	0.126	-	M	M	"	0.35
30	Karnataka	7	0.268	A	M	H	"	0.30
34	Tamil Nadu	-	0.435	-	M	L	"	0.20
35	Kerala	-	0.441	-	H	H	"	0.80
57	Karnataka	-	0.126	-	H	L	"	2.25
D. *Semi-stoloniferous types*								
11	Kerala, Tamil Nadu	7	0.459	A	H	H	"	0.43
15	Karnataka, Tamil Nadu	1	0.207	M	H	H	"	0.94
25	Karnataka	3	0.113	M	H	L	"	0.20
33	Karnataka	7	0.139	L	L	M	"	0.40
36	Tamil Nadu	7	0.233	A	M	M	"	0.29
49	North Eastern Region	5	0.252	M	L	M	"	2.70
55	Karnataka	-	0.189	-	H	L	"	0.33

A = Absent, L = Low, M = Medium, H = High
Taste scored on 1-9 scale, where, 1-3 = Low, 4-6 = Medium and 7-9 = High

The wild stoloniferous group comprised accessions with low to medium oxalic acid content and medium to high acridity of leaf and petiole. M 57 with low oxalic acid content, law acridity in petiole and high tuber yield (2.25 Kg/3 plants) was observed promising.

The semi-stoloniferous group containing all wild morphotypes varied from poor to moderately good in tuber taste, low to moderately high in oxalic acid content and acridity of the tuber, low to high for acridity of the leaf and petiole. M49 having moderately good taste, low oxalic acid content, moderate acridity in tuber and petiole and low acridity in leaf yielded 2.7 Kg/3 plants and appeared promising. The frequency class distribution (Fig. 1) showed that acridity in cooked leaf and petiole had almost normal distribution, whereas, yield, taste and acridity of tuber showed abnormal distribution which suggested differential selection pressure for different characters. The above observations are of interest because, contrary to the expectations, wild forms showed considerable variability in all the characters observed. Thus, forms with good yield, taste and low acridity in cooked tuber, leaf and petiole were found even among the wild stoloniferous and semi stoloniferous groups. The results indicated wide polymorphism in the species for the characters studied.

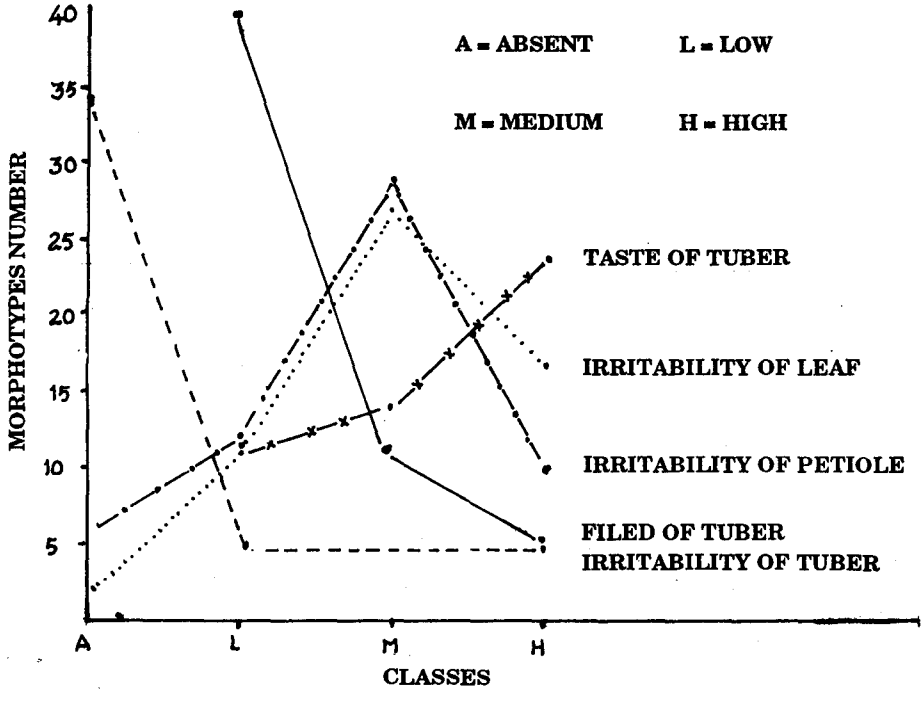

Fig. 1. Showing frequency classes of edibility parameters of taro

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REFERENCES

Anonymous 1989. Annual Report, NBPGR Regional Station, Vellanikkara, Trichur

Unnikrishnan, M.P.K., Thankamma Pillai, K. Vasudevan and G.G. Nair. 1988. Evaluation of Genetic Resources of Taro (*Colocasia esculenta* (L) Schott.) *J. Root Crops* **14** (1) : 27-32