

IISR Prabha and IISR Prathibha - two new high yielding and high quality turmeric (*Curcuma longa* L.) varieties

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ABSTRACT

IISR Prabha (Acc. 360) and IISR Prathibha (Acc. 361), developed at the Indian Institute of Spices Research, Calicut and recommended for release by the All India Coordinated Research Project on Spices are two valued added turmeric (*Curcuma longa*) varieties, developed for the first time through open pollinated progeny selection. These varieties surpassed most of the existing varieties including Alleppey in terms of curcumin content and oleoresin percentage. Maturing in 205 days under rainfed conditions, IISR Prabha has an average yield of 37.47 t/ha (fresh) with a dry recovery of 19.5 per cent, curcumin 6.52 per cent, oleoresin 15.0 per cent and essential oil 6.5 per cent. IISR Prathibha matures in about 225 days under rainfed conditions and has an average yield of 39.12 t/ha (fresh) with a dry recovery of 18.9 per cent, curcumin 6.2 per cent, oleoresin 16.2 per cent and essential oil 6.2 per cent.

Key words : *Curcuma longa*, high yielding and quality varieties, turmeric.

Introduction

Good quality, high yielding turmeric (*Curcuma longa* L.) varieties are a much sought after commodity by the spices industry sector. It is estimated that value-added products such as oils, oleoresins, curcumin etc. constitute about 25-30 per cent of the total export of spices at present. The present paper describes the achievement in developing

two such good quality and high yielding turmeric varieties.

Material and methods

Open pollinated seeds collected from the Germplasm Conservatory of Turmeric at the Indian Institute of Spices Research (IISR), Calicut during 1984-85 were gradually multiplied through 1988-89, in pots. Fifteen of the progenies from these seedling populations, were

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screened for rhizome yield in a replicated trial during 1990-91 at IISR Farm, Peruvannamuzhi. Based on yield, seven of the progenies along with three controls (Suvarna, Sugana and Sudarsana) were tested for yield in a preliminary yield evaluation trial during 1991-92 at Peruvannamuzhi. Multilocation trials of these seven progenies and the controls (Suvarna, Sugana, Sudarsana and Alleppey) were carried out at Peruvannamuzhi (Kozhikode District), Muvattupuzha (Ernakulam District) and Coimbatore during 1992-95. Alleppey (AFT) is a popular good quality turmeric of Kerala whereas Roma (PTS-10) is a ruling variety at Coimbatore; Roma was included as a check at Coimbatore. The experiment was set to a RBD having three replications with a plot size of 3 m².

Observations were recorded on fresh yield per plot, dry recovery as well as curcumin, oleoresin and essential oil contents. The quality parameters were verified at the Quality Evaluation and Upgradation Laboratory, Spices Board, Cochin. The crop was raised adopting standard package of practices. Standard procedures were followed for analysis of quality and statistical processing.

Results and discussion

The preliminary yield evaluation of the seven turmeric progenies and three controls at Peruvannamuzhi revealed significant differences among the entries (Table 1). Multilocation testing of these progenies and the controls at Peruvannamuzhi, Muvattupuzha and Coimbatore during 1992-95 also revealed significant differences among the entries for fresh rhizome yield at all locations and seasons (Table 2). Pooled analysis of data (Table 3) also reflected the differences among the entries for

Table 1. Preliminary yield evaluation of turmeric accessions at Peruvannamuzhi (1991-1992)

Accession	Yield
366	17.10
364	25.60
363	20.83
360	21.96
367	18.40
361	19.87
358	25.23
*Suvarna	9.40
*Suguna	25.07
*Sudarsana	25.00
*Alleppey	-
*Roma	-
CD (5%)	5.14
CV (%)	13.00

Values denote yield/3m² bed in kg

* Controls

fresh yield. The dry recovery of the different entries (Table 4) indicated that even though it varied with location or year, Acc. 360 and Acc. 361 were almost consistent having a mean dry recovery of 19.47 and 17.88 per cent, respectively. Even though few of the other entries including Acc. 367, Suvarna, Alleppey and Roma also had good dry recovery (above 17 per cent), Acc. 360 and Acc. 361 surpassed all other varieties in terms of yield of curcumin per ha (projected value) (Table 5).

The salient yield and quality features of Acc. 360 and Acc. 361 are given in Table 6. Acc. 360 and Acc. 361 had 6.5 and 6.2% curcumin, respectively, followed by Alleppey (6%). The superiority of Acc. 360 and Acc. 361 over other entries including the controls can be

Table 2. Performance of turmeric accessions at different locations

Accession	1992-93		1993-94			1994-95		
	Peruv- anna- muzhi	Muva- ttu- puzha	Peruv- anna- muzhi	Muva- ttu- puzha	Coimb- atore	Peruv- anna- muzhi	Muva- ttu- puzha	Coimb- atore
366	17.73	29.67	18.50	16.05	27.00	19.33	15.83	24.00
364	23.50	38.00	18.67	22.90	20.00	22.83	19.00	19.33
363	24.76	36.00	16.30	22.30	16.00	23.67	16.00	15.00
360	19.03	29.60	11.90	11.43	22.30	15.78	15.17	20.33
367	11.43	31.57	10.50	14.77	19.80	15.83	19.30	18.67
361	18.67	22.50	15.83	14.30	27.50	16.17	19.83	23.33
358	22.40	37.00	18.50	25.63	16.83	22.33	17.90	14.67
*Suvarna	15.40	27.70	11.17	15.65	19.50	17.67	15.67	9.67
*Suguna	24.37	34.20	17.47	23.27	10.83	25.00	22.00	18.33
*Sudarsana	23.53	36.10	22.00	26.17	13.50	23.50	23.67	11.33
*Alleppey	-	26.50	11.33	13.17	23.17	12.50	16.00	22.00
*Roma	-	-	-	-	24.83	10.00	18.67	23.67
CD (5%)	5.76	5.17	2.57	3.21	1.33	1.70	1.77	1.23
CV (%)	17.60	9.40	18.40	19.28	7.80	11.43	11.43	7.21

Values denote yield/3m² bed in kg

*Controls

Table 3. Pooled analysis of mean yield of turmeric accessions

Accession	Yield
366	20.43
364	23.31
363	21.21
360	18.98
367	17.81
361	19.56
358	22.35
*Suvarna	15.69
*Suguna	22.20
*Sudarsana	22.89
CD (5%)	4.50
CV (%)	14.04

Values denote yield/3m² bed (fresh) in kg

*Controls

attributed to the cumulative effect of dry yield and curcumin content. Though Acc. 360 and Acc. 361 had lower fresh yields as compared to Suguna, Sudarsana and Roma, they had maximum yield of curcumin on per hectare basis. In terms of other quality parameters, namely, oleoresin and essential oil contents also these two accessions were superior to the rest having oleoresin contents of 15.0 and 16.2% and essential oil contents of 6.5 and 6.2%, respectively (Table 6). The values obtained at IISR, Calicut were confirmed at the Quality Evaluation and Upgradation Laboratory, Spices Board, Cochin (Table 7).

Acc. 360 and 361 were medium duration varieties taking about 205 and 225 days, respectively, for maturity under rainfed conditions. While Acc. 360 is

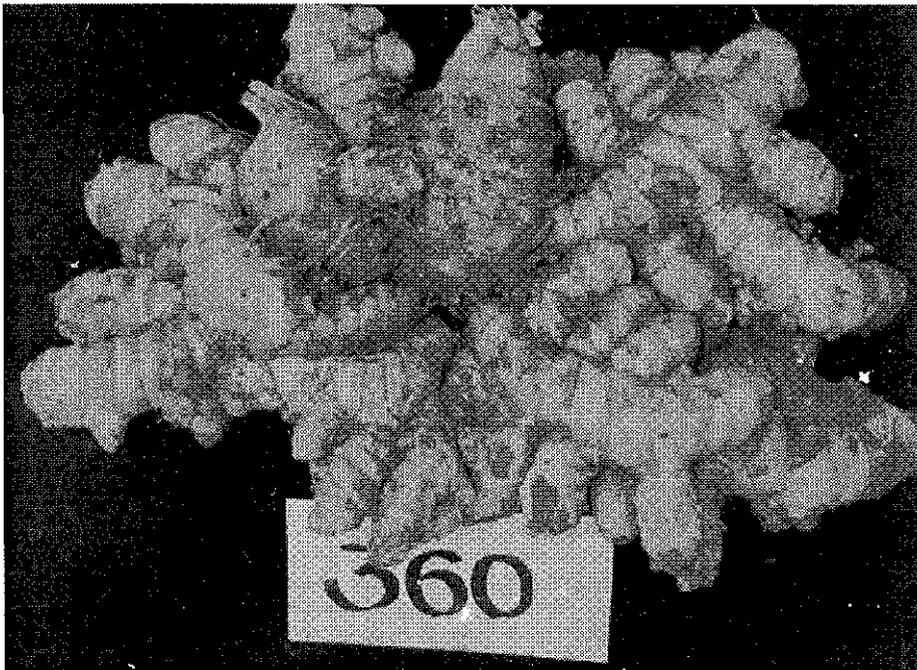


Fig. 1. IISR Prabha, a high yielding and high quality turmeric variety

Table 4. Dry recovery of turmeric accessions at different locations

Accession	1991-92		1992-93		1993-94			1994-95			Mean
	Peruvan- namuzhi	Peruvan- namuzhi	Muvatt- upuzha	Peruvan- namuzhi	Muvattu upuzha	Coimba- tore	Peruvan- namuzhi	Muvattu upuzha	Coimba tore		
366	15.00	15.75	-	12.50	10.00	17.50	16.60	20.00	18.17	15.69	
364	12.50	11.25	12.00	10.00	10.10	17.00	17.37	15.50	14.00	13.30	
363	13.25	12.50	18.80	10.00	10.00	19.00	14.00	14.50	14.00	14.00	
360	19.75	20.00	19.00	17.50	16.20	22.20	20.50	19.50	20.60	19.47	
367	19.50	19.50	20.00	21.50	17.00	21.00	22.25	15.50	20.00	19.58	
361	18.50	19.50	15.00	15.00	13.20	18.00	18.62	21.10	22.00	17.88	
358	12.25	11.25	-	10.00	10.00	15.70	12.50	22.20	12.00	13.22	
*Suvarna	16.75	20.00	19.80	20.00	18.50	22.70	22.00	14.10	13.00	18.54	
*Suguna	13.25	12.00	11.00	10.00	10.50	17.00	14.25	22.70	15.17	13.98	
*Sudarsana	13.00	12.00	12.20	09.80	10.00	14.00	13.75	16.00	14.00	12.75	
*Alleppey	-	-	-	19.80	14.80	21.15	20.25	17.00	18.10	18.52	
*Roma	-	-	-	-	-	20.50	17.00	16.00	20.00	18.38	

*Controls

Table 5. Curcumin content of different turmeric accessions

Accession	1992-93		1993-94		1994-95		Mean	
	Peruv- anna- muzhi	Peruv- anna- muzhi	Coimb- atore	Muva- ttu- puzha	Muva- ttu- puzha	Coimb- atore		Peruv- anna- muzhi
366	267.80	316.16	148.24	147.20	189.96	156.90	332.80	22.78
364	337.92	348.16	270.00	244.80	288.61	205.67	514.80	315.70
363	333.70	306.50	193.20	187.32	222.72	189.00	430.30	266.10
360	524.40	472.40	459.80	465.00	497.00	420.00	482.00	474.37
367	165.02	194.56	156.66	150.60	197.43	134.28	-	166.43
361	509.60	447.30	471.96	263.20	585.77	420.00	438.00	448.10
358	186.48	316.26	158.40	218.32	278.17	140.83	385.02	240.50
*Suvarna	221.70	268.28	150.12	169.20	128.14	-	388.80	221.04
*Suguna	256.96	312.00	110.61	253.76	449.46	211.33	431.28	289.34
*Sudarsana	265.00	321.48	145.91	282.00	280.25	211.25	406.98	273.46
*Alleppey	220.66	350.00	554.40	307.00	326.40	350.41	373.84	354.67
*Roma	-	-	508.85	-	-	568.08	153.00	442.31

Values denote curcumin content ha⁻¹ in kg

*Controls

characterised by smooth, reddish yellow rhizomes and small, stout, upward growing primary fingers (with broad terminal end and tapering base) arranged laterally on either side of the mother rhizomes, shorter finger nodes and almost nil tertiary fingers; Acc. 360 possesses medium - long, stout and turnip shaped primary fingers, reddish - yellow rhizomes, more than one prominent mother rhizome and almost nil

tertiary fingers. Other important agronomic features of these varieties are presented in Table 8.

Based on the performance and quality of these accessions, the XIII Group Meeting of All India Coordinated Research Project on Spices held at Jaipur during 23-25 August 1995 recommended these varieties for release as IISR Prabha (Fig. 1) and IISR

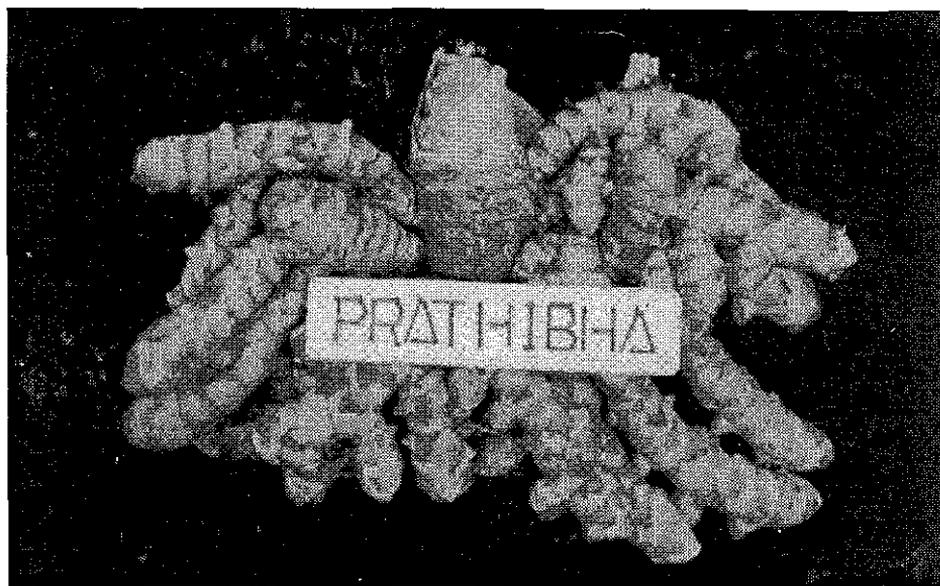


Fig. 2. IISR Prathibha, a high yielding and quality turmeric variety

Table 6. Salient yield and quality features of new turmeric varieties and controls

Accession	Av. fresh yield (t/ha)	Maturity** (days)	Dry recovery (%)	Curcumin (%)	Curcumin (kg/ha)	Oleoresin (%)	Essential oil (%)
Acc. 360	37.47	205(265)	19.50	6.52	474.39	15.00	6.5
Acc. 361	39.12	225(275)	18.50	6.21	448.10	16.20	6.2
*Suvarna	31.36	200(245)	18.75	3.77	221.67	12.91	6.0
*Suguna	44.60	190(240)	12.85	5.05	289.34	13.85	5.7
*Sudarsana	45.76	190(245)	12.00	4.98	273.46	13.63	4.7
*Alleppey	32.84	195(265)	18.00	6.00	354.67	15.12	5.0
*Roma	39.00	215(260)	19.00	5.53	409.77	13.39	4.2

* Controls

** Figures in parentheses indicate maturity at Coimbatore

Table 7. Analysis of quality of new turmeric varieties

Accession	Curcumin (%)		Oleoresin (%)		Volatile oil	
	Bulb	Finger	Bulb	Finger	Bulb	Finger
Acc. 360	5.38	7.51	15.46	14.69	6.67	5.67
Acc. 361	7.49	7.64	17.70	15.46	6.70	5.67

Values are data obtained from Quality Evaluation and Upgradation Laboratory, Spices Board, Cochin

Table 8. Salient agronomic features of new turmeric varieties and controls (pooled data)

Accession	Plant height (cm)	No. of tillers/ clump	Leaf number /clump	Leaf length (cm)	Leaf width (cm)	No. of mother rhizomes	No. of finger rhizomes (primary)	Length of finger rhizomes (cm)
Acc. 360	44.14	2.07	11.5	59.60	17.33	3.00	8.50	7.07
Acc. 361	41.91	1.60	12.5	53.33	16.71	1.30	8.67	10.33
*Suvarna	52.62	1.50	14.0	66.92	19.70	2.50	7.33	13.52
*Suguna	33.10	1.25	11.0	51.77	15.28	2.07	9.33	10.26
*Sudharsana	34.59	1.67	13.0	58.55	15.40	2.50	9.00	10.49
*Alleppey	40.58	2.13	12.0	54.33	17.10	2.33	5.67	7.10
*Roma	100.50	3.20	15.0	40.50	14.20	2.50	11.00	7.35

*Controls

Seedling progenies of turmeric may possess good variability as compared to clonal material as there is a better chance of genetic recombination through the sexual phase. Systematic screening of seedling progenies of this vegetatively propagated crop may yield lines having other desired quality and/or agronomic traits. As the crop is propagated

vegetatively any new variability can be fixed immediately.

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