

## Research Articles

### PCT-13 AND PCT-14 TWO HIGH YIELDING – VARIETIES OF TURMERIC\*

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#### ABSTRACT

Ten high yielding turmeric selections were identified based on preliminary evaluation. These 10 selections were subjected to comparative yield trials at two locations. PCT-13 and PCT-14 were identified as superior lines. PCT-14 is found to be better in quality and has 7.9% curcumin.

#### INTRODUCTION

Turmeric is one of the most important spice crops in India. It is widely used as a condiment in culinary preparations, as a colouring agent in textiles, food and confectionery and as a cosmetic in toilet soaps and face creams. A field experiment was conducted at the National Research Centre for Spices (NRCS), Calicut, to identify high yielding and high quality varieties of turmeric suited to the growing demands of both farmers and traders.

#### MATERIALS AND METHODS

One hundred accessions of turmeric cultivars collected from various parts of the country were subjected to preliminary yield evaluation for three years and 10 high yielding lines selected. These 10 selections, named PCT-10 to PCT-19, were tested for their comparative yield performance for

three years at two locations *viz.*, NRCS Farm and Regional Agricultural Research Station, Andhra Pradesh Agricultural University, Jagtial, Andhra Pradesh.

The selected lines were compared with the local cultivars and two other high yielding selections PCT-2 and PCT-5 in one 3 m<sup>2</sup> plot replicated four times in a Randomized Block Design. These varieties were also analysed for the dry recovery, curcumin, oleoresin and essential oil contents as per the standard procedures.

#### RESULTS AND DISCUSSION

The yield data of the 10 selections and the controls are given in Tables I, II, III, and IV. At Calicut, PCT-14 is the best yielder as it gave a mean yield of 19.83 kg of fresh rhizomes per 3m<sup>2</sup> bed followed by PCT-13 with 19.62 kg/bcd. PCT-13 performed better than other PCT selections and

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Table 1. *Yield data of elite turmeric selections at NRCS, Calicut*

PCT No.	Name of the cultivar	Mean yield Kg./bed			Total	Mean
		1986-87	1987-88	1988-89		
PCT 10	Teliamura, Agarthala	19.65	23.90	13.35	56.90	18.97
PCT 11	Anchal	14.82	16.10	11.38	42.30	14.10
PCT 12	Barhola Jorhat	13.52	19.30	10.74	43.56	14.52
PCT 13	GL Puram-2	22.72	25.70	10.43	58.85	19.62
PCT 14	Singhat Manipur	21.90	24.10	13.50	59.50	19.83
PCT 15	Amkara, Tripura	14.02	24.50	10.95	49.47	16.49
PCT 16	Naogong Assam	16.89	20.40	10.92	48.21	16.07
PCT 17	Along	14.48	18.70	10.45	43.63	14.54
PCT 18	Barpathar	14.89	12.80	11.75	39.44	13.15
PCT 19	Hajo Guwahati	12.25	20.60	11.32	44.17	14.72
Controls						
PCT 2	Moovattupuzha	11.24	13.90	7.04	32.18	10.73
PCT 5	Jorhat	14.35	20.60	11.95	46.90	15.63
Local		14.25	13.90	5.40	33.55	11.18
C. D. at 5%		2.76	5.13	2.34		3.26

controls in 2 of the 3 years tested while PCT-14 performed better than other PCT selections and controls in all the years tested. At Jagtial, PCT-13 recorded the highest mean yield of 9.5 kg/bed closely followed by PCT-14 with 8.84 kg/bed among the PCT selections, and two controls *viz.*, PCT-2 and PCT-5. These two varieties with 190 days of crop duration (short) have compared well with a long duration variety Armour (255 days), which has recorded a mean yield of 13.71 kg/bed at Jagtial. The results of the pooled analysis are given in Tables III and IV. There were significant differences between the mean yields of selections, locations, years and their interactions. However, based on the consistency of performance over the years and

the cumulative mean, these two selections are superior to other PCT selections.

Based on the combined yield data, PCT-13 has given a mean of 14.56 kg of fresh rhizome/bed, giving an estimated yield of 29 tonnes/ha. PCT-14 has given a mean yield of 14.34 kg/bed, with an estimated yield of 28.82 tonnes/ha in comparison to controls PCT-2, PCT-5 and locals which recorded estimated yields of 18.3, 21.0 and 25.02 tonnes/ha, respectively. The yield potential was estimated based on the highest (fresh rhizomes) yield recorded per bed in any location. Based on this estimation PCT-13 gave an yield potential of 60.3 tonnes/ha while PCT-14 gave an yield potential of 54.87 t/ha (Table III.)

Table II. Yield data of elite turmeric selections at RARS, Jagtial

PCT No.	Name of the cultivar	Yield (kg./bed)			Total	Mean
		1986-87	1987-88	1988-89		
PCT 10	Teliamura, Agarthala	6.10	6.63	8.35	21.08	7.03
PCT 11	Anchal	5.92	4.03	5.96	15.91	5.30
PCT 12	Barhola Jorhat	6.08	4.33	5.60	16.02	5.34
PCT 13*	GL Puram-2	8.62	8.20	11.67	28.50	9.50
PCT 14*	Singhat, Manipur	7.92	8.10	10.50	26.52	8.84
PCT 15	Amkara Tripura	5.85	2.46	5.35	13.66	4.55
PCT 16	Naogong, Assam	6.55	5.00	5.73	17.28	5.76
PCT 17	Along	5.30	3.79	5.55	14.64	4.88
PCT 18	Barpathar	5.59	3.57	5.50	14.66	4.89
PCT 19	Hajo Guwahati	6.01	3.79	5.70	15.50	5.17
Controls						
PCT 2	Moovattupuzha	11.76	5.32	5.37	22.45	7.48
PCT 5	Jorhat	6.10	4.36	5.31	15.77	5.26
Local**	Armoor	17.54	14.00	9.50	41.14	13.71
C. D. at 5%		1.54	1.32	1.23	0.77	

\* Crop duration — PCT 13 & 14 = 190 days (short duration)

\*\* -do- — Armoor = 255 days (long duration)

Quality analysis of these selections was done (Ratnambal, 1986) as per the standard methods (ASTA 1968) and the details are given in Table V (Ratnambal, 1986). PCT-14 is found to be the best qualitatively with 7.9% curcumin, 15% oleoresin, 7% oil and 20.4% dry recovery. PCT-13 is moderately good with 4.9% curcumin, 13.5% oleoresin, 6.0% oil and 20.6% dry recovery.

and PCT-14 are given in Table VI. These two varieties have thick and plumpy rhizomes with a bright orange inner core. The rhizomes are very attractive and hence highly preferred by farmers, although these rhizomes shrivel sometimes after curing.

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The morphological characters of PCT-13

Table III. *Analysis of yield of turmeric in the multilocation trial*

Selections tested	Mean yield in Kg/3 m <sup>2</sup> plot (fresh rhizomes)			Projected yield in tonnes/ha (average) @ 2010 beds/ha	Projected yield potential in tonnes/ha (max. in one location)
	Calicut	Jagtial	Grand Mean		
PCT 10	18.97	7.03	13.00	26.13	53.46
PCT 11	14.10	5.30	9.70	19.50	37.79
PCT 12	14.52	5.34	9.93	19.96	41.81
PCT 13*	19.62	9.50	14.56	29.26	60.30
PCT 14*	19.83	8.84	14.34	28.82	54.87
PCT 15	16.49	4.55	10.52	21.15	57.68
PCT 16	16.07	5.76	10.92	21.95	47.23
PCT 17	14.54	4.88	9.71	19.52	51.85
PCT 18	13.15	4.89	9.02	18.13	29.55
PCT 19	14.72	5.17	9.95	19.99	44.22
Controls					
PCT 2	10.73	7.48	9.11	18.31	40.20
PCT 5	15.63	5.26	10.45	21.00	50.25
Local**	11.18	13.71	12.45	25.02	39.37

\* PCT 13, PCT 14 : Crop duration — 190 days

\*\* Local Armour : Crop duration — 225 days

Table IV. *Analysis of variance for yield of fresh rhizome (Kg./3 sq.m)*

SV	DF	SS	MS	F	
Replication (R)	3	38.05	12.68	3.1	*
Treatment (T)	77	10941.48	142.10	34.5	**
Year (Y)	2	827.35	413.68	100.7	**
Location (L)	1	5747.48	5747.48	1398.9	**
Varieties (V)	12	1043.57	86.96	21.2	**
Y x L	2	1349.91	674.95	164.3	**
Y x V	24	359.68	14.98	3.6	**
L x V	12	1145.09	95.42	23.2	**
Y x L x V	24	468.39	19.52	4.7	**
Error	231	949.10	4.11		

CV = 18.3%

\*\* = Significant at 1% level, \* = Significant at 5% level.

Table V. *Quality parameters in turmeric selections\**

Selections tested	Quality parameters (%)			
	Curcumin	Oleoresin	Oil	Dry recovery **
PCT 10	5.5	13.0	7.0	20.4
PCT 11	5.4	12.4	5.0	25.8
PCT 12	5.3	13.3	7.0	25.8
PCT 13	4.9	13.5	6.0	20.4
PCT 14	7.9	15.0	7.0	20.6
PCT 15	5.6	12.7	8.0	25.2
PCT 16	4.0	12.0	5.0	25.3
PCT 17	6.6	13.0	5.0	25.8
PCT 18	4.3	12.0	3.0	26.1
PCT 19	5.5	13.0	7.5	25.0
Armoor	3.5	12.8	9.0	20.4

\* Ratnambal (1986)

\*\* Recorded in Andhra Pradesh

Table VI. *Morphological characters of PCT 13 and PCT 14*

Morphological characters	PCT 13		PCT 14	
	Mean	Range	Mean	Range
Plant height (cm)	107	92-114	136	122-151
Number of tillers	0.87	0-3	0.94	0-3
Number of leaves	6.73	5-9	7.38	5-8
Length of leaf (cm)	46.00	35-54	37.44	14-51
Breadth of leaf (cm)	12.25	8-15	12.09	8-15
No. of mother rhizomes	1.80	1-3	1.80	1-3
Length of mother rhizomes (cm)	5.2	4.2-7.1	5.3	4.4-7.3
Breadth of mother rhizomes (cm)	2.5	2.0-3.8	3.2	2.5-4.0
Internodal distance of mother rhizome (cm)	0.5	0.4-1.0	0.6	0.4-1.1
No. of primary fingers	9.3	4-17	10.13	3-16
Length of primary fingers (cm)	8.6	6-10	8.8	7.5-10.5
Breadth of primary fingers (cm)	2.0	1.8-2.5	2.2	2-2.5

continued ...

Morphological characters	PCT 13		PCT 14	
	Mean	Range	Mean	Range
Internodal distance of primaries (cm)	2.0	1-2.5	2.0	1.5-2.4
No. of secondary fingers	26.37	12-38	20.13	6-32
Length of secondary fingers (cm)	5.1	2-6.4	5.0	3.9-6.3
Breadth of secondary fingers (cm)	1.9	1.7-2.5	2.0	1.6-2.3
No. of tertiary fingers	2.06	0-8	2.93	0-8
Colour of the rhizomes	Orange		Orange	
Weight of rhizomes per clump (mean)	529.39g		565.33g	
Fresh weight (g) max.	845.00g		900.00g	
Rhizome yield-fresh weight (kg.)	14.56kg		14.34kg	
per 3m <sup>2</sup> bed	30kg		27.3kg	
Rhizome yield per ha (Mean) (Fresh rhizomes)	29.266 tonnes		28.823 tonnes	
Yield potential (Fresh rhizomes)	60.3 tonnes		54.8 tonnes	
Quality parameters				
Curcumin	4.9%		7.9%	
Olocoresin	13.5%		15.0%	
Oil	6.0%		7.0%	
Dry recovery	20.4-24.6%		20.6-25.3%	
Crop duration	190 days		190 days	

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