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S Praneetha
Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

V Sivakumar
Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

P Hemalatha
Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Corresponding Author:
S Praneetha
Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Evaluation of turmeric genotypes in Western zone of Tamil Nadu

S Praneetha,V Sivakumar and P Hemalatha

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Abstract
A total 148 numbers of turmeric accession from various parts of India along with BSR 1 and 2 as local adopted check varieties were assessed for three sequential years at Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar, Erode district, Tamil Nadu. Regarding the plant phenotypic traits concerned, among the turmeric accessions evaluated at Western Zone of Tamil Nadu, BS 73 recorded the maximum plant height of 77.11cm. The maximum number of leaves per plant (8.65) and number of tillers per plant (2.63) was recorded by the genotype BS 9. A very wide range of difference in mean performance of genotypes was observed for all the yield and quality parameters in this study. The accession BS 9 recorded higher yield per plot (30.01 kg/6m^2) followed by the accession CL 101 (27.39 kg/6m^2). The accession BS 9 recorded an estimated fresh rhizome yield of 49.82 t/ha, which was the best for rhizome yield than the checks i.e. BSR 1 (33.81 t/ha) and BSR 2 (36.50 t/ha). Highest level of curing per cent was recorded in the genotype CL 204 (18.04%), BSR 1 (18.03%) and the accession BS 9 (17.98%). Estimated cured rhizome yield was recorded highest level in BS 9 (8.96 t/ha) which was followed by CL 101 (8.10 t/ha) and the lowest cured rhizome yield was recorded by the accession CL 206 (6.57 t/ha). Significantly uppermost curcumin content was recorded in the accession CL 206 (5.12%) followed B 3 (5.03%) and BS 9 (4.86%).The highest content of oleoresin was recorded in accession B 9 (11.35%) which was followed by BS 122 (10.87%) and B 2 (10.78%) while the lowest was recorded BS 50 (8.16%). Considerably higher level of essential oil content was recorded in BSR 2 (4.62%) followed by CL 101 (4.52%) and BS 9 (4.47%).

Keywords: Western zone of Tamil Nadu, turmeric genotypes, evaluation, yield, quality

Introduction
Turmeric (*Curcuma longa* L.) is highly remunerative and economically important cash crop originated from South-East Asia. It is a herbaceous perennial crop belongs to the family Zingiberaceae. The generic epithet *Curcuma* was derived from the Arabic word karkum, meaning yellow, referring to the yellow color of the rhizome. Turmeric is distributed in India, south-east Asian countries like Cambodia, China, Indonesia, Madagascar, Malaysia, Philippines and Vietnam and north Australia (Amzad Hossain *et al*., 2005) [2]. Turmeric can be cultivated in diverse tropical conditions, up to 1,600 meters from the sea level, with temperatures varying from 20-40 ºC. Turmeric plant yields a bright yellow powder valued as a natural food dye obtained from the rhizomes after drying and processing plays a key role for coloring the food and in pharmaceuticals. Turmeric powder is a main ingredient in curry powder. The oleoresin of turmeric is used in brine, pickles and also in non-alcoholic beverages, gelatins, butter and cheese etc. Curcunin is used as a colorant in textile industries, hence named as "*Golden spice*" as well as "*Spice of life*" (Tohda *et al*., 2006) [29].
India is the largest producer of turmeric in the world and contributes almost 82% of the total production. Also India is the leading consumer and traditional exporter of turmeric in the global stadium. Indian turmeric is observed as the best in the world market because of its high curcumin content. India exports turmeric to over 100 countries throughout the world. UAE is the major importer of turmeric from India followed by US, Japan, UK, France, Singapore, Srilanka and South Africa (Ravindran *et al*., 2007) [21]. In our country it is widely cultivated in the states of Andhra Pradesh, Tamil Nadu, Orissa, Karnataka, Kerala, Maharastra and West Bengal. Turmeric is cultivated mainly in Erode, Salem, Coimbatore and Namakkal districts in an area of 26, 000 ha with an annual estimated production of 1, 43, 000 tonnes in Tamil Nadu, (Anon, 2008) [4].

Germplasm collection is the main source of variability for turmeric genetic improvement, these collection contributes for major genetic diversity (Chandra *et al.*1997) [7].

As in many other crops, research and development of newer varieties is being constantly pursued to enhance the productivity of turmeric. In any crop improvement program, propitious genotypes are verified for their performance each year at a number of sites, representing the major growing area of the crop. This is to identify genotypes which possess the better qualities of high-yield sustainability to adverse changes in atmosphere condition. With this view, the present investigation was conducted in Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar to identify the elite and high yielding genotypes of turmeric for better yield and quality parameters.

Materials and Methods

The present research experiment was conducted at Thoppanpalyam block of Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar, Erode district, Tamil Nadu. The research farm is falls under western zone of Tamil Nadu which situated at 11° 29' N latitude and longitude of 77° 80' E at 256 m above MSL. The mean annual rainfall is 717 mm, maximum temperature is 33.9 °C and that of the minimum temperature is 21.6 °C. The average wind velocity is 3.2 KMPH. The sunshine hours range from 3.7 to 7 per day with an average evaporation of 4.3 mm per day. The soils of this location considered to characterize the major soil types which are found in the Lower Bhavani Project ayacut area. Soil is sandy loam in nature belongs to Irugur series and Sathyamangalam series of Tamil Nadu. A total number of one hundred and forty eight turmeric genotypes were collected from various parts of the country for evaluating their performance for yield and quality along with BSR 1 and BSR 2 as check varieties under Western zone of Tamil Nadu. The experiment was conducted for three years consecutive years to assess the performance of collected genotypes. The collected seed rhizomes were graded in to 25-30 gram weight and treated with phosalone 35 EC 0.2 per cent plus 0.3 per cent copper oxychloride for 30 minutes to control seed born pest and diseases.

The field was ploughed to a fine tilth and ridges were formed at spacing of 45cm and the treated seed rhizomes were sown at 15 cm spacing in the ridges at a depth of 4cm and planting of each germplasm was done in a plot of 3 m × 2 m size. The experimental plot was designed and laid out as per Randomized Block design (RBD) with two replications in every year. In addition 160: 60: 108 Kg N, P2O5 and K2O as recommended dose of inorganic fertilizers were applied uniformly to all the experiment plots as per the TNAU recommendations.

The important traits like plant height, no. of leaves per plant, no of tillers, rhizome yield/plot, finger rhizome yield and mother rhizome yield with projected yield(t/ha). Phenotypic, yield and quality parameters (curcumin, olereosin and essential oil) were recorded and the data presented in the tables are the observations recorded during the crop growth period and after harvesting the rhizomes. Mean of three year data were statistically analyzed following the procedure of Panse and Sukhatme (1985) [18] and presented in Table 1.

Results and Discussion

The results of the present study showed that among the one hundred and fifty genotypes evaluated, significant differences were observed for the characters studies. The plant height ranged from 77.11cm (BS.73) to 38.63 (BS.116).The mean value for this character was 65.10cm. According to Abbasi *et al*., (1995) [1] the reduction in plant height of turmeric may improve their resistance to lodging and reduce substantial yield losses. Narayanpur and Hanamashetti, (2003) [16] and Srivastava and Singh (2003) [27] reported that plant height was used for characterizarion of turmeric genotypes because the plant height determines the yield potential. Significant variation for plant height was observed by Jilani *et al*. (2012) [12] and Sunita Kumari *et al.,* (2014) [28] in turmeric.

The minimum of 5.85 leaves/plant (CL. 164) to the maximum of 8.65 leaves/plant (BS.9) was recorded by the evaluated genotypes. Mean value of 7.45 leaves/plant was obtained.

B.C. Deb (2016) [6] reported that number of leaves per plant was varied from 11.3 to 9.3 and the overall mean value of 10.6 observed from nine genotypes. Similar resultswere recorded by Xiao, *et al*., (2004) [31] for variation in number of leaves per plant. The maximum number of tillers / plant (2.63) was recorded by the genotype BS.9. Tomar *et al.,* (2005) [30] correlated number of tillers in turmeric plant with yield and found that more number of tillers facilitated for increased yield. Padmadevi *et al.,* (2012) [17] found variation for number of tillers per plant among the genotypes evaluated and the genotype SLP-389/1 showed the highest mean value andsignificantly higher number of tillers/plant (3.27) than other genotypes while PTS-12recorded the lowest (2.08).

Morphological characters are not reliable to classify the types, although some of the types can be distinguished to a certain extent from rhizome characters. The maximum finger yield of 24.36 kg / plot and the maximum rounds (mother rhizome) yield of 5.65 kg/plot was registered by the genotype BS.9, accounting the maximum total yield of 30.01 kg/plot. Hence the estimated yield of 49.82 t/ha was recorded by the genotype BS.9. Chakraborty *et al.,* (2017) [10] reported that the highest rhizome yield per plot was found in NDH-98 (18.09 kg/plot) which is significantly higher than other genotypes, whereas lowest rhizome yield per plot was registered in ACC-48 (6.79 kg/plot). Variation for yield was also reported by Mishra (2019) [20].

The yield and quality parameters for the selected accessions are presented in Table 2. The harvested rhizomes were cured and utilized to analyze the quality characters *viz.*, curcumin, olereosin and essential oil.

A very wide range of difference in mean performance of genotypes was observed for all the yield and quality characters under study. The genotypes showing high performance in desirable direction for various characters may be used as donors for improving the characters for which they had high mean values (Rohit Maurya *et al*., 2018) [22]. The yield per plot showed a significant differences among the accessions evaluated. The accession BS 9 recorded higher yield per plot (30.01 kg/6m^2) followed by the accession CL 101 (27.39 kg/6m^2). The estimated fresh rhizome yield (t/ha) ranged from 35.41 (CL-206) to 49.82 (BS 9) with general mean of 40.60. The accession BS 9 recorded an estimated fresh rhizome yield of 49.82 t/ha, which was the best for rhizome yield than the checks BSR 1 (33.81 t/ha) and BSR 2 (36.50 t/ha). The variation in yield and attributing traits of different cultivars grown under different agro-climatic conditions has been also reported by Salimath *et al.,* (2014) [23], Prasath *et al.,* (2016) [19] and Mishra and Singh (2017) [15].

Fresh yield data could not alone be considered to measure the economic benefits that grower may get because only cured rhizomes were marketed and market prices are again influenced by quality criteria. Highest level of curing per cent

was recorded in the genotype CL 204 (18.04%), BSR 1 (18.03%) and the accession BS 9 (17.98%) compared to the check variety BSR 2 (17.83%.). Estimated cured rhizome yield was recorded its highest level in BS 9 (8.96 t/ha) which was followed by CL 101 (8.10 t/ha) and the lowest cured rhizome yield was recorded by the accession CL 206 (6.57 t/ha).

Significantly highest curcumin content was recorded in the accession CL 206 (5.12%) followed B 3 (5.03%) and BS 9 (4.86%). Numerous information on curcumin content showed conflicting results and variations in curcumin content in different agro-climatic conditions. (Manohar Rao *et al.*, 2005, Sinkar *et al.*, 2005, Singh *et al*. 2013, Anandaraj *et al.*, 2014, and Geethanjali *et al.*, 2016) [14, 26, 25, 3, 9]. The highest content of oleoresin was recorded in accession B 9 (11.35%) which was followed by BS 122 (10.87%) and B 29 (10.78%) while the lowest was recorded BS 50 (8.16%). Considerably highest essential oil content was recorded in BSR 2 (4.62%) followed by CL 101 (4.52%) and BS 9 (4.47%). The quality traits of turmeric is highly sensitive to micro, macro changes in environment and variations in different agro-climatic conditions. Similar results were also reported by Ghosh and Govind (1982) [11].

Conclusion

The differences between all the genotypes were vastly significant for all the traits studied. The most desirable traits viz., number of leaves per plant, tillers per plant, finger and mother rhizome yield, curing per cent, curcumin content, oleoresin and essential oil content were recorded under favorable level in the accessions BS 9 and CL 101 as compared to the genotypes and check varieties studied. These genotypes performed superior for growth, yield and quality character may be used in future crop improvement programme for incorporation of such desirable traits. Based on the performance of the genotypes under Western Zone of Tamil Nadu, the elite genotypes BS 9 and CL 101 may be recommended for commercial cultivation.

Table 1: Performance of turmeric accessions at Agricultural Research Station, Bhavanisagar

S. No	Characters / Acc. No	Plant height(cm)	No. of leaves	No. of tillers	Yield of fingers/plot (Kg/6m^2)	Yield of rounds/plot (Kg/6m^2)	Total Yield/plot (Kg/6m^2)	Yield/ha (t/ha)
1	BS. 1	65.39	7.55	2.21	17.81	3.70	21.51	35.71
2	BS.2	68.70	7.90	2.20	18.29	3.66	21.95	36.44
3	BS.3	63.93	7.80	2.00	18.05	3.76	21.81	36.21
4	BS.4	61.18	7.68	2.00	18.07	3.66	21.72	36.06
5	BS.5	71.00	7.45	2.60	18.34	3.89	22.22	36.89
6	BS.6	64.34	7.90	2.00	17.45	3.71	21.16	35.13
7	BS.7	64.08	7.70	2.00	17.53	3.55	21.07	34.98
8	BS.8	63.60	7.65	2.00	17.61	3.93	21.54	35.76
9	BS.9	64.96	8.65	2.63	24.36	5.65	30.01	49.82
10	BS.10	65.42	7.50	2.00	18.38	3.86	22.24	36.92
11	BS.11	70.26	7.60	2.00	18.46	3.89	22.35	37.10
12	BS.12	63.90	7.55	2.00	17.99	3.77	21.77	36.13
13	BS.13	61.14	7.50	2.16	17.57	3.59	21.16	35.13
14	BS.14	64.40	7.40	2.00	17.98	3.98	21.95	36.44
15	BS.15	60.64	7.70	2.25	18.08	3.63	21.71	36.04
16	BS.16	65.54	7.55	2.00	17.65	4.04	21.69	36.01
17	BS.17	59.50	7.45	2.00	17.84	3.77	21.60	35.86
18	BS.18	60.45	7.20	2.00	18.07	3.84	21.90	36.36
19	BS.19	63.96	7.55	2.30	17.99	3.98	21.96	36.46
20	BS.20	60.68	7.45	2.00	17.10	4.10	21.20	35.20
21	BS.21	57.71	7.40	2.00	17.57	4.17	21.73	36.08
22	BS.22	55.37	7.80	2.19	17.86	4.32	22.17	36.81
23	BS.23	55.16	7.60	2.00	17.50	3.99	21.49	35.68
24	BS.24	69.41	7.35	2.11	18.32	3.89	22.20	36.86
25	BS.25	70.29	7.35	2.00	17.37	4.13	21.50	35.69
26	BS.26	73.08	7.30	2.00	17.61	3.86	21.47	35.64
27	BS.27	66.05	7.35	2.00	16.65	3.69	20.33	33.75
28	BS.28	60.81	7.25	1.60	17.25	3.55	20.80	34.53
29	BS.29	60.73	7.50	2.00	17.74	3.77	21.51	35.71
30	BS.30	50.07	6.80	2.20	17.80	3.89	21.69	36.01
31	BS.31	48.82	6.50	2.00	17.85	3.71	21.55	35.78
32	BS.32	50.92	6.45	2.00	17.99	3.79	21.78	36.16
33	BS.33	47.97	7.05	2.00	17.02	3.56	20.58	34.17
34	BS.34	52.13	7.30	2.25	17.09	3.72	20.81	34.55
35	BS.35	51.78	7.70	2.00	17.65	3.68	21.33	35.41
36	BS.36	56.92	7.45	2.00	17.56	3.77	21.33	35.41
37	BS.37	61.51	7.30	2.17	17.66	3.67	21.33	35.41
38	BS.38	66.58	8.40	2.00	17.82	3.90	21.72	36.06
39	BS.39	66.57	7.55	2.00	17.42	3.71	21.13	35.08
40	BS.40	65.17	7.45	1.92	17.67	3.54	21.21	35.21
41	BS.41	67.34	7.60	2.00	18.05	3.92	21.97	36.47
42	BS.42	65.65	8.45	2.00	18.17	3.68	21.85	36.27
43	BS.43	61.30	7.35	2.32	20.07	4.93	25.00	41.50

44	BS.44	67.35	7.65	2.00	18.06	3.91	21.96	36.46
45	BS.45	65.68	7.10	2.00	18.12	3.77	21.89	36.34
46	BS.46	76.04	7.25	2.41	18.18	3.58	21.75	36.11
47	BS.47	64.36	7.45	2.00	18.15	3.97	22.12	36.72
48	BS.48	63.91	7.10	2.00	17.11	3.66	20.77	34.48
49	BS.49	65.79	7.30	2.07	18.71	4.01	22.72	37.72
50	BS.50	61.91	7.25	2.00	21.85	4.78	26.63	44.21
51	BS.51	64.67	7.30	2.00	17.96	3.84	21.80	36.19
52	BS.52	63.35	7.35	2.00	18.49	3.96	22.45	37.27
53	BS.53	60.78	7.10	2.13	18.88	4.50	23.38	38.81
54	BS.54	60.34	7.45	2.00	17.57	4.17	21.74	36.09
55	BS.55	58.27	7.55	2.00	17.63	4.32	21.95	36.44
56	BS.56	62.22	7.50	1.66	17.19	4.00	21.19	35.18
57	BS.57	64.59	7.30	2.00	17.81	3.90	21.71	36.04
58	BS.58	65.85	7.15	2.00	18.18	4.11	22.28	36.99
59	BS.59	67.85	7.25	2.00	17.96	3.85	21.81	36.21
60	BS.60	64.64	7.50	2.00	18.03	3.65	21.68	35.99
61	BS.61	66.96	7.50	2.25	18.02	3.53	21.55	35.78
62	BS.62	60.84	7.30	2.00	18.15	3.76	21.90	36.36
63	BS.63	56.21	7.05	2.13	17.41	3.90	21.31	35.38
64	BS.64	73.03	7.70	2.00	18.08	3.70	21.78	36.16
65	BS.65	67.20	7.45	2.00	18.24	3.79	22.02	36.56
66	BS.66	65.13	7.10	2.00	18.35	3.52	21.88	36.32
67	BS.67	67.54	7.80	2.00	18.72	3.49	22.21	36.87
68	BS.68	69.90	7.65	2.18	18.52	3.83	22.35	37.10
69	BS.69	74.90	7.95	2.00	17.66	3.79	21.45	35.61
70	BS.70	74.23	7.15	2.00	18.57	4.20	22.77	37.79
71	BS.71	75.61	7.35	2.00	17.15	3.68	20.83	34.58
72	BS.72	74.41	7.05	2.11	17.64	3.93	21.57	35.81
73	BS.73	77.11	8.15	2.00	18.46	3.75	22.21	36.87
74	BS.74	72.75	7.50	2.00	18.39	3.58	21.97	36.47
75	BS.75	69.06	8.05	2.00	17.66	3.65	21.30	35.36
76	BS.76	74.19	7.65	2.00	18.08	3.53	21.61	35.88
77	BS.77	63.52	7.10	2.27	17.64	3.65	21.28	35.33
78	BS.78	59.68	7.95	1.65	17.59	3.67	21.27	35.30
79	BS.79	64.51	7.20	1.55	17.61	3.70	21.31	35.38
80	BS.80	65.60	7.20	2.00	17.82	3.72	21.54	35.76
81	BS.81	69.52	7.70	2.00	17.00	3.63	20.63	34.25
82	BS.82	60.27	7.40	2.20	17.44	4.60	22.04	36.59
83	BS.83	68.45	7.40	2.00	17.94	5.24	23.18	38.48
84	BS.84	65.19	7.65	2.00	17.67	3.70	21.37	35.48
85	BS.85	66.18	7.70	2.50	17.45	3.58	21.03	34.91
86	BS.86	70.35	7.45	2.00	17.76	3.77	21.53	35.74
87	BS.87	70.40	7.45	2.00	18.25	3.66	21.91	36.37
88	BS.88	65.03	7.50	2.25	17.62	3.88	21.50	35.69
89	BS.89	62.46	7.35	2.00	18.20	3.68	21.88	36.32
90	BS.90	64.82	7.70	2.00	17.77	4.26	22.03	36.57
91	BS.91	70.97	7.35	2.00	17.59	3.97	21.56	35.79
92	BS.92	65.74	7.30	2.35	18.02	4.09	22.10	36.69
93	BS.93	65.16	7.25	2.00	17.34	3.69	21.02	34.90
94	BS.94	71.08	7.40	2.00	17.57	3.70	21.27	35.31
95	BS.95	65.52	7.45	2.30	17.85	3.75	21.60	35.86
96	BS.96	63.68	7.50	2.00	18.26	3.66	21.92	36.39
97	BS.97	72.98	7.90	2.00	18.07	3.87	21.94	36.42
98	BS.98	73.66	7.50	2.00	18.30	3.68	21.98	36.49
99	BS.99	63.18	6.95	2.06	17.83	3.72	21.55	35.78
100	BS.100	64.59	6.65	2.00	20.61	4.92	25.53	42.38
101	BS.101	60.83	7.10	2.00	17.98	4.08	22.05	36.61
102	BS.102	67.12	7.12	2.00	17.93	4.25	22.17	36.81
103	BS.103	62.06	7.10	2.16	17.75	4.09	21.84	36.26
104	BS.104	71.38	6.95	2.00	17.32	3.78	21.10	35.03
105	BS.105	64.10	6.50	2.00	17.93	3.63	21.55	35.78
106	BS.106	65.45	6.45	2.27	17.59	4.05	21.64	35.93
107	BS.107	66.50	7.05	2.00	18.13	3.92	22.04	36.59
108	BS.108	53.13	7.55	2.00	18.09	3.68	21.77	36.13
109	BS.109	64.57	7.70	2.12	17.59	3.84	21.43	35.58
110	BS.110	63.88	6.40	2.00	17.64	3.75	21.39	35.51
111	BS.111	64.01	6.70	2.00	17.54	3.66	21.20	35.20
112	BS.112	67.32	6.45	2.03	18.15	3.67	21.81	36.21

113	BS.113	70.80	6.90	2.00	18.22	3.62	21.84	36.26
114	BS.114	69.39	6.70	2.00	18.35	3.59	21.94	36.42
115	BS.115	74.01	6.85	2.00	17.79	3.54	21.33	35.41
116	BS.116	38.63	6.90	2.00	17.79	4.06	21.85	36.27
117	BS.117	67.71	6.85	2.14	17.64	3.98	21.62	35.89
118	BS.118	67.00	7.10	2.00	18.07	3.67	21.73	36.08
119	BS.119	65.89	7.35	2.00	18.40	3.63	22.02	36.56
120	BS.120	60.38	7.10	2.00	17.81	3.65	21.46	35.63
121	BS .121	62.43	6.35	2.00	17.52	3.91	21.43	35.58
122	BS.122	62.80	7.70	2.00	18.38	5.05	23.43	38.90
123	BS.123	72.04	7.20	2.00	17.14	5.06	22.19	36.84
124	BS.124	73.05	6.50	1.85	18.13	3.58	21.70	36.03
125	BS.125	64.51	6.65	1.70	17.38	4.00	21.38	35.49
126	BS.126	66.40	6.30	1.60	17.03	4.84	21.86	36.29
127	BS.127	65.65	6.60	2.00	17.05	3.74	20.79	34.51
128	BS .128	65.91	6.05	2.00	18.68	3.66	22.34	37.09
129	CL. 101	65.36	6.25	2.00	22.31	5.08	27.39	45.47
130	CL .121	64.92	7.40	2.26	18.24	3.54	21.78	36.16
131	CL .131	61.84	6.80	2.00	17.16	3.62	20.79	34.51
132	CL. 133	67.32	8.00	2.00	17.43	3.64	21.07	34.98
133	CL .147	66.29	7.10	2.20	17.66	3.62	21.28	35.33
134	CL .148	67.51	7.25	2.00	18.24	3.62	21.86	36.29
135	CL. 149	64.70	7.05	2.20	17.12	3.91	21.03	34.91
136	CL .154	70.78	6.80	1.75	16.37	4.84	21.21	35.21
137	CL .161	75.21	7.25	2.00	16.95	3.72	20.67	34.32
138	CL. 164	74.02	5.85	2.00	12.86	5.55	18.41	30.56
139	CL. 168	72.05	6.50	2.00	17.04	3.70	20.73	34.42
140	CL. 172	64.98	7.10	2.00	16.69	3.72	20.41	33.88
141	CL .197	61.80	6.80	2.00	17.83	3.70	21.53	35.74
142	CL .198	67.19	7.50	2.00	18.08	3.52	21.60	35.86
143	CL .199	74.97	7.55	2.00	17.56	3.63	21.18	35.16
144	CL. 200	62.77	6.80	2.42	17.84	3.99	21.83	36.24
145	CL. 206	63.71	6.35	2.00	17.28	4.05	21.33	35.41
146	CL .209	64.16	6.70	2.00	17.82	3.83	21.65	35.94
147	B1	66.84	7.05	2.17	18.54	3.59	22.13	36.74
148	B2	65.82	6.70	2.00	20.39	3.52	23.91	39.69
149	B3	71.26	7.30	2.00	20.40	3.60	24.00	39.84
150	B4	61.16	6.70	2.00	18.70	3.67	22.37	37.14
CD (5%)		6.34	1.08	0.36	2.17	0.48	2.68	4.52

Table 2: Performance of high yielding turmeric accessions for quality parameters

Accessions	Yield /plot (6m^2)	Estimated fresh rhizome yield (t/ha)	Curing%	Estimated cured rhizome yield (t/ha)	Curcumin (%)	Oleoresin (%)	Essential oil (%)
BS 9	30.01	49.82	17.98	8.96	4.86	11.35	4.47
BS 50	26.63	44.21	17.52	7.75	4.62	8.16	4.40
BS 100	25.53	42.38	17.56	7.44	4.43	9.72	3.36
BS 122	23.43	38.90	17.52	6.82	4.02	10.87	2.72
B2	23.91	39.69	17.36	6.89	4.16	10.78	4.14
B3	24.00	39.84	16.87	6.72	5.03	10.43	3.84
CL 101	27.39	45.47	17.82	8.10	4.53	10.50	4.52
CL 206	21.33	36.41	18.04	6.57	5.12	10.71	3.98
BSR 1	20.37	36.81	18.03	6.64	4.20	9.00	3.75
BSR 2	21.99	38.50	17.83	6.86	4.32	9.18	4.62
CD(P= 0.05)	5.34	2.35	1.87	0.72	1.22	1.93	1.03

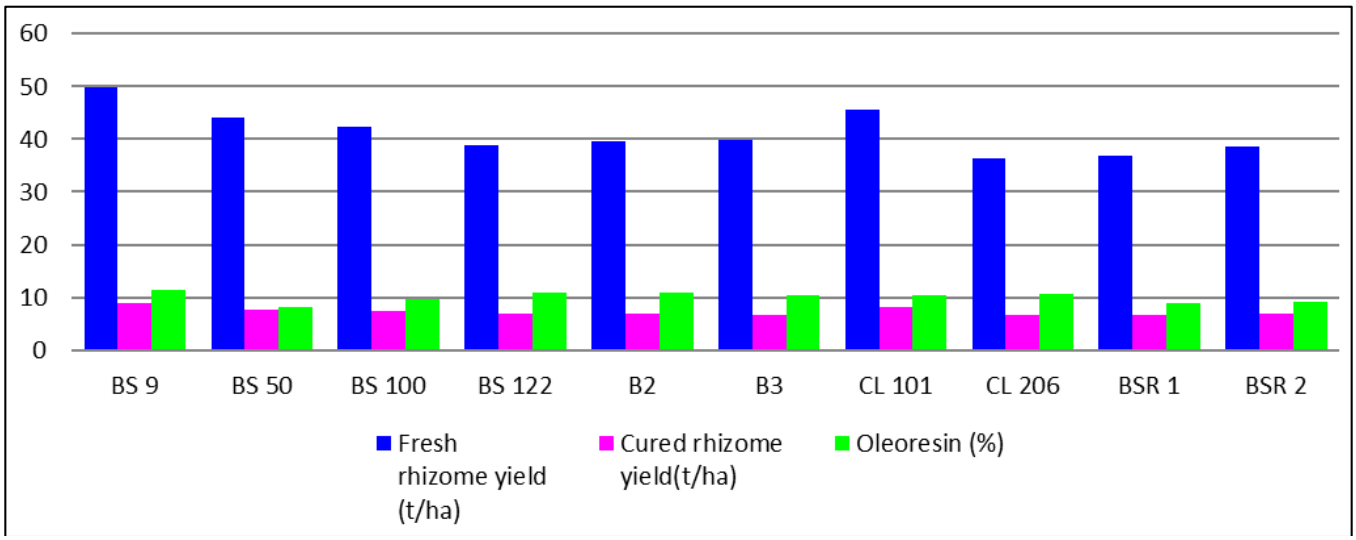

Fig 1: Performance of high yielding turmeric accessions for yield and qulaity

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