Phenotypic variability and selection of candidate plus trees (CPTs) of *Terminalia chebula* in the Western Vidarbha region of Maharashtra, India

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ABSTRACT: *Hirda (Terminalia chebula Retz.) is one of the most important medicinal plants which has got the focus of the world in past few years due to the use of its fruits in ayurvadic medicines. Because of its increasing demands in the holistic health care system, the selection of high yielding genotypes with high value of phytoconstituents is paramount to ensure sustained supply of quality fruits of the species. the variability studies in T. chebula which is a precursor to the selection of high yielding genotypes, are still in initial stage. The present study was carried out to assess the phenotypic variability and for the selection of Candidate Plus Trees (CPT's) of T. chebula in Western Vidarbha region of Maharashtra. The extensive survey was conducted in all the five districts (i.e. Akola, Amravati, Buldhana, Yavatmal and Washim) of Western Vidarbha region of Maharashtra, but, T. chebula was found only in Akola and Amravati districts (Malghat area). All together twenty-eight candidates plus trees (CPT's) were selected from the study area. All these fruit samples were analyzed for its phenotypic variability and fruit yield. On the basis of phenotypic variability twenty-eight trees were selected from the Western Vidarbha region of Maharashtra. The maximum fruit yield was recorded in TC-2 (84kg) followed by TC-15 (80kg) and TC-17 (79kg) while maximum fruit and pulp weight was recorded in TC-6 (38.40gm and 25.70gm) followed by TC-24 (24.17 and 16.87gm) and TC-19 (23.45 and 15.58gm). The smallest size fruits and pulp was recorded in TC-12 (5.12 and 3.06gm) fallowed by TC-8 (8.84 and 5.32gm) and TC-9 (9.06 and 5.87gm). The maximum tree height was recorded in TC-2 (21.50m) followed by TC- 10 (17.50m) and TC-12 (16.60m). While maximum DBH was recorded in genotype TC-15 (84cm) followed by TC-22 (82 cm) and TC-15 (81 cm). The selected CPT's can be utilized to produce quality planting material for farmers to plant this high value multipurpose agroforestry tree species on the farm boundary, to get extra income as there is a high demand for its fruits.*

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1. INTRODUCTION

Terminalia chebula Retz. commonly known as chebulic myrobalan, locally in Marathi it is called as Hirda (2n = 24)**.** The tree is deciduous in nature and belongs to family combrataceae. The *T. chebul* is a native plant of India and its dried fruits are widely used in different types of medicines in Ayurvda, Homeopathy and Uinani. *T. chebula* has been also employed as co-ingredient in Ayurvedic formula named "*Triphala*". This formulation is useful as detoxifying agent of colon, purgative in chronic constipation, it helps in digestion and as a body rejuvenate. Apart from the medicinal and clinical uses, *T. chebula* is used in the preparation of ink and in dye as a mordant for the basic aniline days and the fruits are extensively used for tanning leather. The species is widely spread all over southern Asia and throughout India. Dymock *et al.* (1976) particularly in state such as Himachal Pradesh, Uttarakhand, Utter Pradesh, Punjab, Madhya Pradesh, Maharashtra, Gujarat, Karnataka Naik *et al.* (2004). It is found in naturally growing forests as well as in farmer fields and up to some extent it is under cultivation. In Maharashtra *T. chebula* is distributed in western Maharashtra, Kokan, North-Maharashtra, Eastern-Vidarbha and Western-Vidarbha region particularly in Malghat area and Akola (Deshmukh *et al.* 2025).

Because of its proven medicinal value and demand for other commercial uses. The selection of high yielding genotypes of the species is vital for ensuring sustained supply of its quality fruits through mass multiplication and conservation. The variability study in *T. chebula* which is a precursor to the selection of high yielding genotypes are still in initial stage. The principal objective of the present investigation was to obtain information on the variability in *T. chebula* evaluated

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on the basis of various morphological characters of trees along with the yield and physical parameters of fruits collected from the Western Vidarbha region of Maharashtra (particularly from Malghat forest and Akola).

Study area

The present study was carried out on the phenotypic variability by selection of Candidate Plus Trees (CPT's) of *Terminalia chebula* Retz. Through extensive survey was conducted in all the five districts (*i.e.* Akola, Amravati, Buldhana, Yavatmal and Washim) of Western Vidarbha Region of Maharashtra. However, *T. chebula* trees was were located only in Akola and Amravati districts (particularly Malghat area) of the region.

Climate of the study area varies due to variation in altitude. There are three distinct seasons *viz.* Monsoon (rainy), Winter and Summer The study site lies between 20^0. 41' 731" N, 77^0. 01'742'E and 21^0. 42'505' N, 77^0. 29.750'E (Fig. 1). The climate of the study site is tropical with high temperature in summer which rises up to 46^0 C. The area experiences a good rainfall during monsoon which ranges from 950-1400 mm per annum with 60 to 65 average number of rainy days.

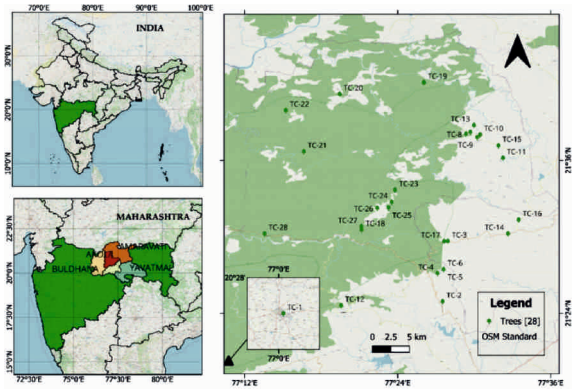

Figure 1: Map of the study area.

2. METHODOLOGY

The perspective survey for the selection of candidate plus trees (CPT's) was carried out during 2020 & 2021 in the Western Vidarbha region of Maharashtra (particularly Malghat area Dr.P.D.K.V., Campus, Akola). Selection of candidate plus trees (CPT's) were done following standard criteria, such as the height, straightness, girth, diameter and vigour of the plant including pest and disease infection, weakness and defects (if any), The CPT's were selected with a minimum isolation distance of one kilometer. The latitude, longitude and altitude of each location was recorded the help of Global Positioning System (GPS) so that, the CPT would be easily located as and when needed for further observations. The observations were recorded for eight morphological characters of trees *viz.* height of tree (m), diameter at breast height (cm), diameter at base (cm), girth at breast (cm), girth at base (cm), canopy spread (m), estimated fruit yield (kg), approximate age of tree (years)and ten parameters of the fruits *viz.* fruit length (mm), fruit breadth (mm), pericarp thickness (mm), stone length (mm), stone breadth (mm), fruit weight (g), pulp weight (g), dry pulp weight (g), shape and color of fruits.

100 fresh and fully ripened matured fruits were collected from each tree and kept in cloth bags with proper labeling to record the data of various fruit characteristics. The height of the tree was recorded with the help of Ravi altimeter, The length and breadth of fruit and stone was measured by digital vernier caliper while fresh weight, pulp weight and dry pulp weight was recorded with digital balance. The data available on individual characters were subjected to the Randomized Block Design, Panse and Sukhatme, (1967). The mean sums of squares for all the fruit parameters were highly significant indicate the wide range of variations in all the selected genotypes (CPT's) of *T. chebula*. The phenotypic and genotypic variances were calculated by utilizing the respective mean square values from the variance table. The genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) were calculated by the formula suggested by Burton and Devane (1953).

3. RESULT AND DISCUSSION

A total 28 (Twenty-eight) CPT.s were selected from the study area. All the genotypes ware in the altitude range of 960 to 3708 feet with the mean altitude of 2604 ft. (Table No.1). The maximum altitude at which the genotype observed was in the Malghat region (3708 ft.) of Amravati district and minimum altitude was recorded in Akola district (960 ft.). Out of all twenty-eight genotypes 16 genotypes ware above mean altitude of 2604 ft. and 12 genotypes were under the mean altitude. The mean age (approximate) of the twenty-eight genotypes were 36.46 years and the range was 29 to 42 years at the time of survey.

Among all the twenty-eight genotypes, 50% genotypes were above mean age and 50% were below mean age. The mean height of the tree was 13.51m. The genotype TC-2 (21.50m) was the tallest followed by TC-10 (17.50m) and TC-12 (16.60m) while TC-13 (10.40m) was a dwarfed genotype followed by TC-14 (10.50m) TC-7 (11.30m). Among all the twenty-eight genotype of *T. chebula* nine genotypes were taller and nineteen genotypes were dwarfed over the mean height of trees 13.51m. These findings are in line with the findings of *Navhale et al.* (2011) where they studied the forty genotypes of *T. chebula* from the

Konkan region of Maharashtra and analysis of variance revealed that significant variation among the genotypes for all the characters. *Prajapati et.al.* (2020) studied the morphological characters of *T. chebula* in Chhattisgarh state of India and reported the significant variation in all the fruits parameters. The mean diameter (DBH) of twenty-eight genotypes was 61.43 cm. and the range of DBH was 33 to 84 cm. (Table No.2). Highest DBH was found in TC-15 (84 cm) followed by TC-22 (82 cm) and TC-20 (81 cm) while lowest DBH was found in TC-1 (33 cm) followed by TC-25 (35 cm) and TC-24 (42 cm). The mean girth (GBH) was found to be 193.14 cm. The girth of all the twenty-eight genotypes was range between 105 to 264 cm. The maximum GBH was found in TC-15 (264 cm) followed by TC-22 (257 cm) and TC-20 (254 cm), were as minimum was recorded in TC-1 (105cm) followed by TC-25 (111cm) and TC-24 (124cm). The mean crown spread (length) was found to be 10.07m. and range was 7.00 to 17.50 m. While mean (E-W) crown width was 9.77 m. with the range of 6.00 to 13.50 m and mean (N-S) crown width was 11.29 m. with the range of 7.00 to 17.00 m. The mean estimated fresh fruit yield was 66.00kg. The range of estimated fresh fruit yield of all twenty-eight genotypes were found to be 51 to 84kg. (Table No.3). The highest yield was recorded in TC-2 (84.00kg) followed by TC-15 (80.00kg) and TC-17 (79.00kg). Lowest yield was recorded in TC- 4 (52.00kg). In general, the fruit yield of the trees is low in the natural

Table 1 : GPS coordinates, altitude and age of the *T. chebula* genotypes

Accession Code/ CPT No.	Latitude (N)	Longitude (E)	Altitude (Ft)	Approximate age of tree (Years)
TC – 1	20. 41'731"	077. 01'742"	960	29
TC – 2	21. 24'934"	077. 27'524"	1850	42
TC – 3	21. 27'265"	077. 26'495"	2341	40
TC – 4	21. 27'137"	077. 27'131"	2670	32
TC – 5	21. 27'454"	077. 27'604"	2640	31
TC – 6	21. 31'034"	077. 21'910"	2948	33
TC – 7	21. 29'659"	077. 27'655"	3684	42
TC – 8	21. 31'341"	077. 33'486"	3253	31
TC – 9	21. 38'174"	077. 29'717"	2490	35
TC – 10	21. 37'839"	077. 30'237"	2510	34
TC – 11	21. 36'185"	077. 32'251"	2595	36
TC – 12	21. 29'760"	077. 28'932"	3708	41
TC – 13	21. 32'993"	077. 33'750"	2968	38
TC – 14	21. 30'271"	077. 32'859"	3220	34
TC – 15	21. 35'403"	077. 32'684"	2705	37
TC – 16	21. 37'171"	077. 31'909"	2626	39
TC – 17	21. 39'221"	077. 29'138"	2458	40
TC – 18	21. 40'228"	077. 29'223"	2284	37
TC – 19	21. 42'505"	077. 27'946"	1814	35
TC – 20	21. 41'112"	077. 20'219"	1694	42
TC – 21	21. 36'429"	077. 17'805"	1991	34
TC – 22	21. 34'786"	077. 16'187"	1779	38
TC – 23	21. 32'518"	077. 23'352"	3185	41
TC – 24	21. 33'156"	077. 23'732"	3232	34
TC – 25	21. 32'888"	077. 23'646"	3217	36
TC – 26	21. 32'042"	077. 23'276"	3191	35
TC – 27	21. 30'607"	077. 21'168"	2825	38
TC – 28	21. 24'934"	077. 21'842"	2070	37
General Mean	2604	36.46		
Range	960 – 3708	29 – 42		

population of *T. chebula.* Hence, there is scope to increase yield in this species. Basu et. al. (2017) reported that fifteen accessions from natural populations of *T. chebula* from Karnataka and Tamilnadu evaluated. Substantial variation was observed in morphology and phytochemicals within the species. Also suggested that individual selection within natural population will be effective for further improvement in *T. chebula.* Daneve et. al. (2018) selected twenty-one CPT's of Mahaneem (*Ailanthus excels* Roxb.) through intensive survey from Haryana, Rajasthan and Gujarat on basis of phenotypic characters, observed ample of variation.

The mean fresh fruit length was recorded was 34.58mm with the wide range of variation of 19.14 to 42.60 mm The TC-6 recorded maximum fruit length *i.e.* 42.60 mm and TC-12 recorded minimum fruit length *i.e.* 19.14 mm. (Table No.3). The mean fresh fruit breadth 23.46 mm was recorded with the maximum fruit breadth in TC-6 (37.20 mm) and minimum in TC-8 (16.18mm) the variation in fruit characters *viz.* fruit weight, fruit length, fruit width was also reported in Aonla (*Emblica officinalis*) by Pandey et. al. (2008). The mean pericarp thickness was found to be 8.16mm with the range of 4.26 to 15.85mm. Again the, TC-6 (15.85 mm) recorded maximum pericarp thickness. The mean stone length was found to be 23.24 mm and the maximum was found in TC-10 (31.65 mm) and minimum was found

Table 2 : Morphological variation in CPT's of *Terminalia chebula* Retz. in Western Vidarbha Region of Maharashtra.

Accession Code/ CPT No.	Tree height (m)	DBH (cm)	GBH (cm)	Diameter at base (cm)	Girth at base (cm)	Crown spread			Fresh fruits estimated yield (kg)
						Crown length (m)	Crown width (m)		
							E-W	N-S	
TC – 1	12.60	33	105	38	120	10.20	9.60	12.00	64.00
TC – 2	21.50	64	201	75	235	17.50	13.50	17.00	84.00
TC – 3	11.80	54	171	78	245	8.00	12.00	12.50	58.00
TC – 4	14.60	43	140	48	168	11.20	6.00	7.50	52.00
TC – 5	15.20	66	206	78	245	12.60	7.00	8.00	54.00
TC – 6	12.80	56	175	68	213	10.30	8.50	10.00	74.00
TC – 7	11.30	67	210	78	245	9.00	10.00	14.00	68.00
TC – 8	11.50	69	217	81	254	9.50	10.70	13.50	75.00
TC – 9	12.70	58	183	69	217	7.50	13.00	14.00	61.00
TC – 10	17.50	63	198	73	230	13.00	12.00	14.00	73.00
TC – 11	14.70	56	175	68	213	10.00	11.50	12.00	67.00
TC – 12	16.60	64	201	84	264	12.00	12.50	13.50	51.00
TC – 13	10.40	67	211	77	242	7.00	9.00	8.00	58.00
TC – 14	10.50	73	230	87	274	7.50	12.00	14.00	61.00
TC – 15	12.70	84	264	92	289	8.70	13.00	16.00	80.00
TC – 16	13.30	67	210	77	242	9.00	10.00	12.00	67.00
TC – 17	12.40	72	226	87	275	8.40	10.20	12.60	79.00
TC – 18	14.00	69	217	76	258	10.50	11.40	13.50	63.00
TC – 19	13.20	57	179	63	198	10.00	10.00	12.00	66.00
TC – 20	14.50	81	254	91	286	11.30	6.50	7.00	75.00
TC – 21	12.00	54	170	59	185	9.20	10.40	11.20	63.00
TC – 22	15.30	82	257	94	295	12.00	8.20	8.70	69.00
TC – 23	14.70	60	188	74	232	10.40	9.40	11.60	74.00
TC – 24	13.10	42	131	52	163	9.80	8.00	9.00	64.00
TC – 25	12.00	35	111	48	150	9.00	6.40	7.20	55.00
TC – 26	11.50	45	142	57	179	8.60	7.00	7.80	62.00
TC – 27	12.60	74	232	82	257	9.60	7.60	8.20	73.00
TC – 28	13.30	65	204	76	239	10.20	8.20	9.30	58.00
General Mean	13.51	61.43	193.14	72.50	229.04	10.07	9.77	11.29	66.00
Range	10.40 -	33 –	105 –	38 –	120 -	7.0–	6.0 –	7.00 –	51 –
	21.50	84	264	94	295	17.50	13.5	17.00	84

in TC-15 (13.01 mm). While the mean stone breadth was found to be 14.98 mm with the maximum in TC-6 (22.50 mm) and minimum was recorded in TC-20 (10.19 mm). The mean fresh fruit weight was recorded 16.01g. with the maximum fruit weight was recorded in TC-6 (38.40g) and minimum was recorded in TC-12 (5.12g). There is a wide range of variation in the fruit weight of the *T. chebula.* Paray *et al.* (2017), selected *Salix alba* CPT's from twenty locations from two districts (Ganderbal and Bandipora) of Kashmir valley

Table 3 : Mean performance of T. chebula genotypes for fruits parameters.

Accession CPT No.	Fresh Fruit length (mm)	Fresh Fruit breadth (mm)	Pericarp Thick-ness (mm)	Stone length (mm)	Stone breadth (mm)	Fresh Fruit Weight (g)	Fresh Pulp Weight (g)	Dry Pulp Weight (g)	Fruit color	Fruit shape
TC – 1	36.64	24.74	8.05	24.70	14.82	13.71	7.09	4.15	Yellowish green	Ovoid
TC – 2	38.23	29.95	9.86	27.68	21.05	18.14	9.84	6.20	Yellowish green	Ovoid
TC – 3	37.40	25.90	7.10	24.80	20.70	15.60	8.70	5.10	Green	Ovoid
TC – 4	36.42	24.15	7.88	27.25	21.50	14.50	8.00	4.90	Yellowish green	Round
TC – 5	34.45	25.12	7.80	23.70	19.78	13.60	7.50	4.65	Yellowish green (Red-tinch)	Ovoid
TC – 6	42.60	37.20	15.85	28.60	22.50	38.40	25.70	16.76	Yellowish green (Red-tinch)	Round
TC – 7	35.77	24.90	6.73	24.56	16.08	13.28	9.14	5.91	Yellowish green	Ovoid
TC – 8	26.27	16.18	5.87	19.10	12.05	8.34	5.32	3.78	Yellowish green (Red-tinch)	Round
TC – 9	28.13	21.31	6.04	20.67	14.28	9.06	5.87	3.67	Green	Round
TC – 10	41.43	26.73	8.97	31.65	17.72	14.55	9.83	5.28	Yellowish green	Ovoid
TC – 11	37.12	23.64	7.28	29.41	16.22	11.74	7.32	4.25	Redish Yellow	Ovoid
TC – 12	19.14	17.74	4.26	14.73	11.18	5.12	3.06	1.72	Green	Round (very small)
TC – 13	34.42	23.72	8.38	23.02	14.43	21.17	9.43	5.78	Yellowish green	Ovoid
TC – 14	31.00	22.93	9.23	24.43	11.70	20.81	12.83	5.72	Green	Ovoid
TC – 15	38.84	19.78	6.75	13.01	10.80	18.53	11.82	9.32	Yellowish green	Round
TC – 16	35.27	25.11	8.68	22.17	14.05	16.64	10.27	8.17	Golden green	Round
TC – 17	31.70	24.13	7.92	22.43	16.85	14.32	8.67	5.29	Yellowish green	Ovoid
TC – 18	39.47	22.80	9.56	26.18	11.75	20.12	14.70	6.90	Green	Long
TC – 19	40.37	21.89	8.67	29.11	14.48	23.45	15.58	9.67	Yellowish green	Long
TC – 20	31.34	22.32	9.67	20.54	10.19	14.25	8.91	5.20	Green	Ovoid
TC – 21	39.45	21.58	9.22	23.77	12.28	13.44	7.84	4.96	Yellowish green	Ovoid
TC – 22	31.37	21.73	8.17	16.63	13.02	14.29	7.95	5.00	Green	Round
TC – 23	33.49	20.25	6.81	16.98	13.63	13.25	7.31	4.74	Yellowish green	Ovoid
TC – 24	41.46	23.44	9.07	26.46	14.35	24.17	16.87	9.27	Yellowish green	Long
TC – 25	24.52	18.34	6.05	16.37	12.26	10.69	7.08	4.83	Yellowish green (Red tinch)	Round (Small)
TC – 26	28.34	19.70	7.32	23.80	12.27	12.45	6.50	3.80	Golden yellowish green	Round
TC – 27	35.40	26.70	9.10	22.20	15.30	16.65	9.88	5.65	Green	Ovoid
TC – 28	38.20	24.80	8.40	26.70	14.30	18.45	9.20	5.25	Yellowish green	Ovoid
General Mean	34.58	23.46	8.16	23.24	14.98	16.01	9.73	5.92	-	-
Range	19.14 42.60	16.18 37.20	4.26 15.85	13.01 31.65	10.19 22.50	5.12 38.40	3.06 25.70	1.72 16.76	-	-
SE (M)+	1.61	1.45	0.53	1.06	0.62	0.73	0.40	0.46	-	-
CD (5%)	4.55	4.11	1.49	3.00	1.76	2.07	1.12	1.30	-	-
CV %	8.05	10.54	11.13	7.89	7.19	7.89	7.07	13.18	-	-

Genotypes found Significant at 1 % and 5% level of significance.

following the comparison tree method. Jindla *et al.* (1987) studied variability in Rohida (*Tecomella undulate* Seem.) and reported wide range of variation in height of tree, diameter at breast and canopy diameter throughout germplasm collection form Rajasthan and Gujarat.

The maximum fruit weight is the desirable character for the development of high yielding genotypes in near future. The Mean fresh pulp weight 9.73g was recorded the maximum pulp weight was recorded in TC-6 (25.70g) and minimum was recorded in TC-12 (3.06g). Whereas, mean dry pulp weight 5.92g was recorded while maximum dry pulp was recorded in TC-6 (16.76g) and minimum was recorded in TC-12 (1.72g) (Table No. 3). The five fruit colors were observed during survey. Whereas the fruits were found to be of Ovoid, Round and Long shapes (Table No.3). Shobith *et al.* (2024) examined diversity of thirty genotypes in *T. chebula* and reported **t**hat the substantial variations were observed across the accessions. They have also reported that the genotype from the Vidarbha Region of Maharashtra MHTC-04 and KETC-05 from Karnataka state respectively exhibited superior growth performance and recommended as the best genotypes among all 30 accessions from North-East and South India.

Phenotypic coefficient of variation (PCV) was observed slightly higher than the Genotypic coefficient of variation (GCV) for all the characters studied. In the present investigation the Phenotypic and genotypic coefficient of variation for various characters ranged from 17.20 to 47.69% and 15.63 to 46.14%, respectively (Table No. 4). Table-4 also reveals that, the selection on the basis of phenotypic performance can be equally effective to that of genotypic performance, similar results were also reported by Varma and Bangarva (2007) in *populous deltoides* for fruit weight, fruit length, fruit diameters and weight of seed.

Table 4 : Estimation of Phenotypic and Genotypic variance in *T. chebula.*

S.No.	Fruit characters	PVC %	GCV %
1.	Fresh Fruit length (mm)	17.20	15.63
2.	Fresh Fruit breadth (mm)	20.63	18.11
3.	Pericarp Thickness (mm)	26.27	23.80
4.	Stone length (mm)	20.25	20.01
5.	Stone breadth (mm)	23.14	22.93
6.	Fresh Fruit Weight (g)	38.84	38.63
7.	Fresh Pulp Weight (g)	45.02	44.70
8.	Dry Pulp Weight (g)	47.69	46.14

Genotypic and phenotypic coefficient of variation measured the extent of variation present in the population for the particular character. The Phenotypic coefficient of variation (PCV) in *T. chebula* was highest for dry pulp weight (PCV-47.69%) and the minimum value was observed in fresh fruit length (PCV–17.20%). The genotypic coefficient of variation (GCV) is useful criterion which helps to assess extent of genetic variability existing in the material in relation to various plant characters. Maximum genotypic coefficient of variation was also found in dry pulp weight (GCV-46.14%) and the minimum value was observed in fresh fruit length (GCV–15.63%). Similar results were also reported by Pandey *et al.* (2008) in *Emblica officinalis* for fruit diameter, fruit length, seed diameter, seed weight, T.S.S., total sugar, reducing sugar and acidity. The estimates of of phenotypic and genotypic coefficient of variation are presented in Table-4. High genotypic coefficient of variation of the characters in *T. chebula* Viz. Dry Pulp Weight (g), Fresh Pulp Weight (g), , Fresh Fruit Weight (g), Pericarp Thickness (mm), Stone breadth (mm) can be very much exploited for identifying the plus tree. On the basis of performance of above characters three genotypes in each fruit character are given in Table-5.

Table 5 reveals that the TC-6 is the best genotype among all the 28 genotypes on the basis of genotypic coefficient of variance for the fruit characters in *T. chebula*. These genotypes are useful to streamline the further mass multiplication of quality planting material by means of vegetative propagation of true to type seedlings for the farmers. The commercial cultivation of the species will reduce the threat on the natural populations and helps in the conservation of this economically important medicinal tree species in the region.

4. CONCLUSIONS

The present study concluded that substantial amount of variation was observed for different morphological and fruit parameters of *T. chebula* in Western Vidarbha region of Maharashtra. In general, for selection of CPT's preference was given to the parameters like tree

Table 5 : Best three CPT's on the basis of characters having high genotypic coefficient of variance.

Rank	Dry Pulp Weight (g)	Fresh Pulp Weight (g)	Fresh Fruit Weight (g)	Pericarp Thickness (mm)	Stone breadth (mm)
I	TC–6 (16.76)	TC–6 (25.70)	TC–6 (38.40)	TC–6 (15.85)	TC–6 (22.50)
II	TC–19 (9.67)	TC–24 (16.87)	TC–24 (24.17)	TC–2 (9.86)	TC–4 (21.50)
III	TC–15 (9.32)	TC–19 (15.58)	TC–19 (23.45)	TC–20 (9.67)	TC–2 (21.05)

height, DBH, tree canopy, fruit yield, weight of fruit, weight of fruit pulp as these characters were under genotypic control. On the basis of different characters and fruit yield, genotypes TC-2 was observed to be best CPT in terms of growth parameters, while genotype TC-6 was found to be the best in respect of fruit parameters. In general, phenotypic coefficient of variation was greater than the genotypic coefficient of variation. For selection of CPT's it is advocated to give preference to weight of fresh fruit, weight of fruit pulp, weight of dry fruit and weight of seed as these characters were under genotypic control. There is also a need to carry out the further study ascertain the variability of the CPT's in terms of their phytoconstituents which is vital of selection of elite genotypes. These CPT's can be used in further research programme for the development of the high yielding genotypes in the region. The variation observed in plants and fruits of *T. chebula* could very well be exploited for identifying plus trees and also used for the development of seed orchards.

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