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Studies on qualitative traits variation in tamarind (*Tamarindus indica* L.)

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Abstract

Present investigation entitled Studies on qualitative traits variation in tamarind (*Tamarindus indica* L.) was conducted at 'AICRP for Dryland Agriculture and Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The plant material consisted of 26 tamarind genotypes. Studies conducted on qualitative parameters viz., shape of canopy, bark colour, growth habit, seasonability, foliage, flowering time, bud colour, petal colour, pod shape, pod size, pod colour, pulp colour, endocarp colour and seed colour. Tamarind genotypes revealed a wide range of variation of all characters under investigation.

Keywords: *Tamarindus indica*, qualitative parameters, variation

Introduction

Tamarindus indica L. is a multipurpose fruit tree and commonly known as Indian date, tamarind, tamarindier, tamarindo, tamarinier. (Divakara *et al.*, 2012) [1]. At present tamarind is cultivated in 54 countries of the world; 18 countries in its native range and 36 other countries where it has become naturalized. The major areas of production are in the Asian and American continents. In most countries, tamarind is a subsistence tree crop mostly meeting local demands, although some of it is also exported (Hiwale, 2015) [2].

Tamarind was recorded over a century ago as a variable species especially for pulp colour and sweetness. Since there is such extensive variation in characters such as foliage, flower and pod production and timber quality, there is a considerable scope to improve the species (Radhamani *et al.*, 1998) [5]. Knowledge of genetic variation and structure of a species and genetic parameters of important traits are essential to develop effective improvement and conservation strategies. Considering the above facts the present investigation was undertaken to study the variation in qualitative characters in seedling originated tamarind genotypes.

Material and methods

Present investigation was conducted at 'AICRP for Dryland Agriculture and Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The plant material consisted of 25 seedling originated tamarind genotypes and one released variety 'Akola Smruti'. All cultural operations were uniformly practiced in experimental trees. The observations on qualitative traits viz., shape of canopy, bark colour, growth habit, seasonability, foliage, flowering time, bud colour, petal colour, pod shape, pod size, pod colour, pulp colour, endocarp colour and seed colour from each of 26 tamarind genotypes were recorded and further genotypes categorised with respective quantitative traits.

Results and Discussion

The results of qualitative parameters of tamarind genotypes and the frequency distribution of qualitative parameters of tamarind genotypes have been presented in Table 1 and Table 2, respectively. The observations recorded on qualitative traits from each of 26 tamarind genotypes indicated a considerable amount of variation in all the traits. Five different shapes of canopy were recorded in the tamarind population viz., cone, dome, semicircle, oval and irregular. Among them, dome shape of canopy was recorded in number of eight trees followed by cone and semicircle in five trees each.

Three different bark colours were observed among genotypes categorised as light brown, brown and thick brown. Thick brown bark colour was recorded in ten genotypes followed by brown colour in nine and light brown colour in seven genotypes.

Fifteen tamarind genotypes has spreading growth habit whereas, eleven genotypes has upright growth habit. Among twenty six genotypes, four genotypes *viz.*, Akola Smruti (AKT-10), DAAT E-4, DAAT WF-5 and DAAT WF-8 are annual and rest twenty two are biennial in nature.

The different foliage characteristics found among the genotypes were sparse and dense. Among them, dense foliage were recorded in twenty two genotypes and rest four genotypes sparse. Early, mid and late flowering were observed among genotypes. Seven genotypes were early, ten were mid and rest nine were late in their flowering time.

The different types of bud colour found among the population are whitish green, pink and dark pink. Fifteen genotypes have dark pink bud colour followed by whitish green in six genotypes and pink in five genotypes. The petal colour varied from pale yellow to yellow. Yellow petal colour was recorded in eighteen genotypes. However, eight genotypes have pale yellow petal colour.

Pod shape were categorised as straight, slightly curved, moderately curved and deeply curved. Slightly curved pod shape were recorded in eleven genotypes whereas deeply curved pod shape recorded in single genotype namely DAAT WF-5. Medium pod size was observed in eighteen genotypes. Big sized pods were in six genotypes. However, two genotypes had very big pod size.

Two pod colours were observed among the genotypes *viz.*, light brown and brown. Brown pod colour was recorded in

eighteen genotypes. However, eight genotypes have light pod colour. Light brown, brown and red brown pulp colour was recorded among twenty six tamarind genotypes. Brown pulp colour was observed in thirteen genotypes followed by light brown colour in nine genotypes and four genotypes had red brown pulp colour. Among the genotypes fifteen genotypes had white endocarp colour, eight genotypes had dull white endocarp colour while three genotypes had extra white endocarp colour.

The seed colour varied from light brown to glassy black. Brown seed colour was observed in fourteen genotypes. Nine genotypes had light brown seed colour whereas, three tamarind genotypes had glassy black seed colour.

It is suggested that, the colour variation in reproductive organs is restricted to only in temperate trees (Nagarajan *et al.*, 1998 [7] and Singh *et al.*, 2008) [8]. Singh and Nandini (2011) [9] reported that, the colouration in reproductive organs that can be used not only as morphological marker in progeny testing programme but can also enhance mean value of fruit set by enhancing the pollinators. The marketing price of the pulp is decided on the basis of exocarp colour (light brown with slight shining) and endocarp membrane colour (white or *phool patti*) of the pulp (Karale, 2001) [3]. The results on similar lines were also reported by Prabhushankar and Melanta (2004) [4], Rao and Subramanyam (2010) [6] in tamarind.

Table 1: Qualitative parameters of tamarind genotypes

Sr. No.	Genotypes	Shape of canopy	Bark colour	Growth habit	Seasonability	Foliage	Flowering time
1	DAAT W - 3	Semicircle	Brown	Spreading	Biennial	Dense	Mid
2	DAAT W - 4	Dome	Brown	Spreading	Biennial	Dense	Late
3	DAAT W - 5	Dome	Thick brown	Spreading	Biennial	Dense	Late
4	DAAT W - 6	Semicircle	Light brown	Spreading	Biennial	Sparse	Mid
5	DAAT W - 7	Cone	Thick brown	Spreading	Biennial	Dense	Mid
6	DAAT W - 8	Semicircle	Light brown	Spreading	Biennial	Dense	Late
7	DAAT W - 9	Oval	Brown	Spreading	Biennial	Sparse	Mid
8	DAAT W - 10	Oval	Light brown	Upright	Biennial	Dense	Late
9	DAATE - 3	Cone	Thick brown	Upright	Biennial	Dense	Mid
10	DAAT E - 4	Dome	Brown	Spreading	Annual	Dense	Early
11	DAATE - 5	Cone	Brown	Upright	Biennial	Dense	Mid
12	DAATE - 6	Cone	Thick brown	Upright	Biennial	Dense	Mid
13	DAATE - 7	Irregular	Thick brown	Spreading	Biennial	Sparse	Late
14	DAATE - 8	Semicircle	Brown	Spreading	Biennial	Dense	Early
15	DAATE - 9	Cone	Light brown	Upright	Biennial	Dense	Late
16	DAATE - 10	Irregular	Thick brown	Upright	Biennial	Dense	Early
17	DAATE - 11	Dome	Brown	Upright	Biennial	Sparse	Early
18	DAAT WF - 1	Dome	Thick brown	Upright	Biennial	Dense	Early
19	DAAT WF - 2	Oval	Thick brown	Upright	Biennial	Dense	Early
20	DAAT WF - 3	Oval	Light brown	Spreading	Biennial	Dense	Early
21	DAAT WF - 4	Dome	Thick brown	Spreading	Biennial	Dense	Mid
22	DAAT WF - 5	Dome	Thick brown	Upright	Annual	Dense	Late
23	DAAT WF - 6	Dome	Light brown	Upright	Biennial	Dense	Late
24	DAAT WF - 7	Semicircle	Light brown	Spreading	Biennial	Dense	Mid
25	DAAT WF - 8	Irregular	Brown	Spreading	Annual	Dense	Late
26	Akola Smruti (AKT-10)	Irregular	Brown	Spreading	Annual	Dense	Mid

Table 1 conti..: Qualitative parameters of tamarind genotypes

Sr. No.	Genotypes	Bud colour	Petal colour	Pod shape	Pod size	Pod colour	Pulp colour	Endocarp colour	Seed colour
1	DAAT W - 3	Whitish green	Pale yellow	Slightly curved	Medium	Brown	Light Brown	Dull white	Brown
2	DAAT W - 4	Dark pink	Yellow	Slightly curved	Medium	Light brown	Red brown	Extra white	Light brown
3	DAAT W - 5	Pink	Yellow	Slightly curved	Medium	Light brown	Brown	White	Brown
4	DAAT W - 6	Dark pink	Pale yellow	Slightly curved	Medium	Brown	Brown	White	Light brown
5	DAAT W - 7	Pink	yellow	Slightly curved	Very Big	Light brown	Red brown	Extra white	Brown
6	DAAT W - 8	Whitish green	Pale yellow	Moderately curved	Big	Brown	Brown	Dull white	Brown

7	DAAT W - 9	Pink	Yellow	Slightly curved	Medium	Brown	Light Brown	White	Brown
8	DAAT W -10	Dark pink	Yellow	Straight	Medium	Brown	Light brown	White	Light brown
9	DAAT E - 3	Dark pink	Yellow	Slightly curved	Medium	Brown	Brown	White	Brown
10	DAAT E - 4	Dark pink	Yellow	Slightly curved	Medium	Light brown	Brown	White	Glassy black
11	DAAT E - 5	Pink	Yellow	Moderately curved	Medium	Brown	Light Brown	White	Glassy black
12	DAAT E - 6	Pink	Yellow	Moderately curved	Big	Brown	Brown	White	Light brown
13	DAAT E - 7	Whitish green	Yellow	Moderately curved	Big	Light brown	Light brown	Dull white	Brown
14	DAAT E - 8	Pink	Yellow	Straight	Medium	Brown	Light Brown	Extra white	Brown
15	DAAT E - 9	Pink	Pale yellow	Straight	Medium	Light brown	Light brown	White	Light brown
16	DAAT E - 10	Pink	Pale yellow	Straight	Medium	Brown	Brown	White	Brown
17	DAAT E - 11	Pink	Yellow	Straight	Medium	Brown	Light brown	Dull white	Brown
18	DAAT WF - 1	Whitish green	Yellow	Straight	Medium	Light brown	Brown	Dull white	Brown
19	DAAT WF - 2	Whitish green	Yellow	Straight	Medium	Brown	Brown	Dull white	Brown
20	DAAT WF - 3	Pink	Yellow	Slightly curved	Medium	Light brown	Red brown	White	Light brown
21	DAAT WF - 4	Pink	Yellow	Straight	Medium	Brown	Red brown	White	Light brown
22	DAAT WF - 5	Whitish green	Yellow	Deeply curved	Very Big	Brown	Brown	White	Brown
23	DAAT WF - 6	Pink	Pale yellow	Slightly curved	Medium	Brown	Brown	White	Light brown
24	DAAT WF - 7	Pink	Pale yellow	Moderately curved	Big	Brown	Light brown	Dull white	Brown
25	DAAT WF - 8	Pink	Pale yellow	Moderately curved	Big	Brown	Brown	Dull white	Glassy black
26	Akola Smruti (AKT-10)	Pink	Yellow	Slightly curved	Big	Brown	Brown	White	Light brown

Table 2: Frequency distribution of qualitative parameters of tamarind genotypes

Characteristics	Classes	Frequency
Shape of canopy	Cone	5
	Dome	8
	Semicircle	5
	Oval	4
	Irregular	4
Bark colour	Light brown	7
	Brown	9
	Thick brown	10
Growth habit	Upright	11
	Spreading	15
Seasonability	Annual	4
	Biennial	22
Foliage	Sparse	4
	Dense	22
Flowering time	Early	7
	Mid	10
	Late	9
Bud colour	Whitish green	6
	Pink	5
	Dark pink	15
Petal colour	Pale yellow	8
	Yellow	18
Pod shape	Straight	8
	Slightly curved	11
	Moderately curved	6
	Deeply curved	1
Pod size	Medium	18
	Big	6
	Very big	2
Pod colour	Light brown	8
	Brown	18
Pulp colour	Light brown	7
	Brown	15
	Red brown	4
Endocarp colour	Dull white	8
	White	15
	Extra white	3
Seed colour	Light brown	9
	Brown	14
	Glassy black	3

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