



Correlation Studies Between Different Physico-Chemical Characteristics of *Terminalia bellirica* (Roxb.) Fruits

BJ Pawar, AU Nimkar*, YB Taide, SS Harne, VB Shambharkar and SM Khachane

Department of Forestry, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, P.O. Krishinagar, Akola 444 104 (Maharashtra)

*E-mail: au_nimkar@yahoo.co.in

DOI: 10.5958/2455-7129.2017.00027.9

ABSTRACT

Terminalia bellirica is a multipurpose medicinal tree species. The fruits of the species are used in many local, ayurvedic medicines and as important constituent of "Triphala". Physico-chemical traits of *Terminalia bellirica* fruits like fresh weight, diameter, length, weight of fruit pulp, moisture content, dry weight, seed weight, TSS, acidity, total sugar, reducing and non reducing sugar in fruits of *Terminalia bellirica* were quantitatively measured for correlation studies. The correlation studies revealed that there was highly significant and positive correlation between weight of fresh fruit with weight of fruit pulp, weight of dry fruit, diameter of fruit and with seed weight while T.S.S. exhibited significant and negative correlation with non reducing sugar.

Key Words:

Correlation, Physico-chemical, *Terminalia bellirica*

INTRODUCTION

The expression of a particular character is an aggregate of complex contribution of so many other characters. In tree improvement programme, a clear understanding of the nature and degree of association among different traits is of great importance because the choice of one character can favour the appearance or disappearance of the other. Correlation, an important statistical tool, helps in determining such associations among different factors under consideration.

Terminalia bellirica commonly known as Bahera belongs to family combretaceae. The trade name Bahera is based on the Indian name of the tree. Fruits of this tree are useful in cough, asthma, bronchitis, dropsy, dyspepsia cardiac disorders, skin diseases, leprosy, ulcer, eye diseases, scorpion sting and myocardial depressive activity.

The seeds are useful in thirst, vomiting, bronchitis, ulcer, reliveness (Maiti et al. 2005).

This species becomes a material of paramount importance to be worked upon especially of its future benefits owing to its diverse uses. For this, the number of promising fruit bearing trees at different locations of Akola and Amravati district of Maharashtra were identified and evaluated for different fruit parameters.

In the present investigations, the relationship of traits in *Terminalia bellirica* fruits namely, fresh weight, diameter, length, weight of fruit pulp, moisture content, dry weight, seed weight, TSS, acidity, total sugar, reducing and non reducing sugar have been studied.

MATERIAL AND METHODS

The present investigation was conducted with the objective to identify the fruit bearing trees

of *Terminalia bellirica* and to study the variability of physico-chemical characteristics in *Terminalia bellirica* fruits. An extensive survey was carried out in different places of Akola and Amravati districts of Maharashtra. The mature fruit bearing trees of *Terminalia bellirica* was identified and marked at different places. Fruits were collected from these marked trees for the evaluation of physico-chemical parameters of the fruits. Physical characters of fruits were undertaken at Department of Forestry, Dr. P.D.K.V., Akola and chemical analysis was undertaken in the laboratory of Agricultural Chemistry and Soil Science, College of Agriculture, Dr. P.D.K.V., Akola.

Observations were recorded for twelve parameters related to fruits viz., fresh weight, diameter, length, weight of fruit pulp, moisture content, dry weight, seed weight, TSS, acidity, total sugar, reducing and non reducing sugar. The data obtained for these traits were statistically analyzed by using randomized block design and completely randomized design in three replicates for each treatment as described by Panse and Sukhatme (1967) and Chandel (1984) and subjected for correlation coefficient analysis as per the method suggested by Panse and Sukhatme (1978) and Gupta (1984). The significances at 5 and 1 per cent level of significance were tested as per the formula given by Gosset (1908).

RESULTS AND DISCUSSION

The values for simple correlation coefficient between twelve physico-chemical characters of *Terminalia bellirica* fruits are presented in Table 1. The present correlation coefficients study was worked out for all the 12 character combinations. Out of 66 combination of simple correlation, 16 combinations were found to be positive and significant and 1 combination was negative and significant. Out of 16 positive and significant correlations all 16 combinations were observed to be significant at 1 per cent level of probability and 1 combination was negative and significant at 5 per cent level of probability. Rest of the relations was found to be non-significant.

Highly significant and positive correlation coefficient were obtained between weight of fresh fruit with weight of fruit pulp (0.927), weight of

fresh fruit with weight of dry fruit (0.910), weight of fresh fruit with diameter of fruit (0.855), weight of dry fruit with diameter of fruit (0.853), weight of seed with weight of dry fruit (0.833), weight of seed with weight of fresh fruit (0.807), weight of fruit pulp with diameter of fruit (0.805), weight of dry fruit with weight of fruit pulp (0.794), weight of fruit pulp with length of fruit (0.742), length of fruit with weight of fresh fruit (0.729), weight of dry fruit with length of fruit (0.714) and weight of seed with weight of fruit pulp (0.705), length of fruit with diameter of fruit (0.694), weight of seed with diameter of fruit (0.686) and weight of seed with length of fruit (0.629) and non reducing sugar with total sugar (0.602) while total soluble solid (TSS) exhibited significant negative correlation with non reducing sugar (-0.506). Similar types of correlation study between physical and chemical properties of *Jamun* fruits were reported by Srivastava *et al.* (2012). The correlation study are very useful in understanding variability exist in respect to physical and chemical characters of fruits. Pradeep kumar (2006) reported positive and significant correlation between weight of fruit pulp with length of fruit.

The studies showed wide variation in physico-chemical characteristics of fruit sample of *Terminalia bellirica* marked at different locations. Environmental conditions, soil types and genetic make-up of the trees greatly influence the quantitative profile of the different chemical constituents of the tree in their fruit samples collected from the different places of Akola and Amravati district, which have different climatic conditions as well as different soil profiles where *Terminalia bellirica* are naturally growing. Variation in the flowering season in these places leading to non-uniformity in the age of fruits along with different soil profiles from where the plants absorb minerals have possibly led to variation in the physico-chemical characteristics of fruit samples.

Terminalia bellirica species exhibited very high range of variation which could be exploited for identifying promising trees and can also be useful in developing clonal orchards.

Table 1. Correlation coefficients among different pairs of characters in *Terminalia bellirica* (Roxb.) fruit.

	Wt. of fresh fruit (g)	Diameter of fruit (cm)	Length of fruit (cm)	Wt. of fruit pulp (g)	Moisture content of fruit (%)	Wt. of dry fruit (g)	Wt. of seed (g)	TSS (%)	Acidity (%)	Total sugar (%)	Reducing sugar (%)	Non Reducing sugar (%)
Wt. of fresh fruit (g)	1											
Diameter of fruit (cm)	0.855**	1										
Length of fruit (cm)	0.729**	0.694**	1									
Wt. of fruit pulp (g)	0.927**	0.805**	0.742**	1								
Moisture content of fruit (%)	-0.048	-0.203	-0.086	-0.121	1							
Wt. of dry fruit (g)	0.910**	0.853**	0.714**	0.794**	-0.386	1						
Wt. of seed (g)	0.807**	0.686**	0.629**	0.705**	-0.212	0.833**	1					
TSS (%)	0.215	0.200	0.293	0.186	-0.223	0.238	0.293	1				
Acidity (%)	0.172	0.159	-0.123	-0.036	-0.284	0.218	0.219	0.0347	1			
Total sugar (%)	-0.249	-0.014	-0.174	-0.200	0.025	-0.251	-0.340	-0.215	0.179	1		
Reducing sugar (%)	-0.096	0.128	0.117	-0.060	0.066	-0.128	-0.207	0.203	0.212	0.726	1	
Non reducing sugar (%)	-0.144	-0.120	-0.320	-0.076	0.078	-0.202	-0.206	-0.506*	0.012	0.602**	-0.044	1

**Significant at 1 per cent level (r=0.515); *Significant at 5 per cent level (r=0.496)

REFERENCES

- Chandel SRS 1984 A Handbook of Agricultural Statistics. Achal Prakashan Mandir, Kanpur. PP 565.
- Gosset WS 1908 Test of statistics. Gupta, S.C. and Kapoor, V.K. (eds.). Fundamental of Mathematical Statistics. 9th Rev. Ed. Sultan Chand and Sons., New Delhi, PP 12-38.
- Gupta SP 1984 Statistical methods. XV Ed. Sultan Chand and Sons., Daryagani, New Delhi.
- Maiti S, Hasanuzzamun SM and Tshitila 2005 Guide on medicinal & Aromatic plants of SAARC countries. Panse VG and Sukhatme PV 1967 Statistical Methods for Agricultural workers, 2nd ed. New Delhi, ICAR: 99-116.
- Panse VG and Sukhatme PV 1978 Statistical Methods for Agricultural workers, ICAR, New Delhi. p. 610.
- Pradeepkumar T, Philip J and Johnkutty I 2006 Variability in physico-chemical characteristics of mango genotypes in northern Kerala. J. Trop. Agric., 44 (1-2): 57-60.
- Srivastava Vartika, Rai PN and Kumar P 2012 Correlation study for physico-chemical characters in jamun. Hort Flora Reseach Spectrum., 1(1):83-84.