TECHNICAL BULLETIN No.2

GOVERNMENT OF MADHYA PRADESH
FOREST DEPARTMENT

VOLUME TABLES

(General Standard and Commercial)

OF

TERMINALIA TOMENTOSA

FOR

MADHYA PRADESH

By

B. NATH
RAJENDRA PAL SINGH
M.L. KHARCHE

Issued By
THE MENSURATION BRANCH (1963-1966)

Reprint Issued By
EXTENSION AND CONSULTANCY DIVISION
OF
STATE FOREST RESEARCH INSTITUTE
JABALPUR (M.P.)

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CONTENTS

DEFINITIONS

1. Standard Timber : Logs with a minimum diameter of 20 cms. over bark at thin end, volume being taken exclusive of bark.

2. Standard bole : Length of the bole from ground level upto the point where the average diameter over bark is 20 cms.

3. Twice bark thickness : Difference between the average diameter over and under bark.

4. Bark percentage of total volume : Percentage of difference of sectional areas over bark and under bark divided by sectional area over bark at half height of a tree.

5. Bark percentage in volume of logs : Percentage of difference of mid sectional area over bark and under bark divided by sectional area over bark.

6. Branch small wood : Branches upto 5 cms. dia. over bark.

7. Standard small wood : Anything less than 20 cms. mean diameter over bark down to a minimum mean diameter of 5 cms. over bark at the end.

8. Branch small wood volume : Volume of branch small wood.

9. Standard small wood volume : Volume of small wood on the standard definitions calculated by full basal area and including bark.

10. Commercial stem timber in round : The volume without bark of a commercial bole in a sound tree.

11. Commercial bole : The length of the bole which the contractor is actually prepared to convert into sawn timber.

12. Sapwood percent in commercial timber : Percentage of the following factor reduced from one.

$$\text{Factor} \quad \frac{S''1 + 2S''2 + S''3}{S'1 + 2S'2 + S'3}$$

Where S'1, S'2, S'3 being the sectional areas corresponding to the diameters with sapwood at butt-end section, mid section and thin end section and S"1, S"2 and S"3 are the sectional areas corresponding to these diameters without sapwood at those places.

13. Fuel : The total small wood and portion of standard timber which is unutilisable as timber.

FOREWORD

Saja (*Terminalia tomentosa*) has a wide range of distribution in M.P. and is equally at home in the Teak Forests, Sal Forests and in the major portion of the mixed miscellaneous forests next only to Teak and Sal, it is about the most important commercial timber and is sought after for a large variety of purposes.

The existing Volume tables for Saja compiled with data collected on All India basis, afforded proportionately little representation to M.P. and therefore had restrictive application in M.P. particularly for accurate scientific work.

The need for compilation of Volume tables for Saja which will have particular applicability for M.P. is apparent.

This publication will, it is hoped, fulfil this long standing need.

Effort made by the State Forest Research Institute, Jabalpur in compiling the basic data from a wide range of distribution, its scientific processing, analysis, interpretation, and tabulation in readily usable form, deserves special mention. The publication is commended for use not only by the forests and forest contractors in Madhya Pradesh, but also for their counterparts working in similar forests in the adjoining States. It is hoped this publication will prove very useful.

N.K. SHARMA,
Dy. Chief Conservator of Forests
Madhya Pradesh

PREFACE

Terminalia tomentosa is one of the important timber species of Madhya Pradesh. It occurs almost all over the State in varying density in different types of forests. At the instance of the Advisory Committee on forest research for Madhya Pradesh, preparation of general volume tables of saja was included as one of the items in the Quinquinnial programme of the mensuration branch. In pursuance of this, field data collection was started as early as 1963 and continued till July, 1966. Since then, there have been changes in the staff engaged on this cooperative work. It would not be out of place to mention about the guidance and services of those who were instrumental in making a start for this work. Names of Sarvashri J.J. Dutta and M.S. Tomar deserve special mention. Collection of field data and computation thereof, after required undertaking strenuous touring of interior forests where working conditions were not very pleasant and over time work on computation and compilation work to complete this work. For the major amount of field work and computation, Forest Rangers Shri G.P. Shukla and Shri D.K. Bhatia, Dy. Rangers Shri Prem Prakash Rai and Shri D.S. Rathore deserve special credit, without whose sincere efforts it would not have been possible to complete this work.

Thanks are also due to Shri N.K. Sharma, Chief Conservator of Forests for going through the manuscript and for writting a foreword.

B. NATH
RAJENDRA PAL SINGH
M.L. KHARCHE

JABALPUR
Dated 20th September 1966

Volume Tables (General Standard and Commercial) of *Terminalia Tomentosa* for Madhya Pradesh

INTRODUCTION

Terminalia tomentosa is one of the economically most important timber species of Madhya Pradesh. After Teak and Sal, it is perhaps the most sought for timber species.

Terminalia tomentosa occurs in Teak, Sal and Mixed Forests almost all over the State but is scanty and if, at all, attains hardly pole size or is almost absent in north and north western part of the State.

The present volume tables have been prepared for estimation of outturn from trees of different sizes on a rational basis for ready use in the field. For Madhya Pradesh there was no such set of volume tables available. In all India volume tables for *T. tomentosa* by Griffith, Sant Ram & Jagdamba Prasad, Madhya Pradesh was represented by only 15 trees that too restricted to Bilaspur. Besides, the various volume figures in all India tables hardly represent the growth pattern of saja in Madhya Pradesh, hence the work of compiling these tables exclusively for Madhya Pradesh was undertaken.

As far as possible, the whole range of the distribution of *T. tomentosa* in Madhya Pradesh was covered, while collecting the field data for the volume tables. In all 601 trees were measured for this purpose. A statement of the distribution of the trees by diameter and height classes in different forest divisions is given in Table I.

The collection of the requisite data required the filling up of F.R.I. form 28 (sample plot form 7) for standard timber and of F.R.I. form 139 for commercial timber. Eighty trees were scaled standing for various measurements with the help of relaskope. The corresponding under bark measurements were correlated with the available data on bark statistics from the remaining 521 trees of which the measurements were taken after felling the trees.

Relaskope is a handsized optical instrument weighing only 14 ounzes and has a wide application in the field. With a little practice the following measurements can be made by one man :-

(1) Measuring diameters on standing trees at any height.
(2) Measuring total height.
(3) Degree and percent scales for fixing any height point or measuring any width.
(4) Basal area per acre by Bitterlich method.
(5) Topographic scale between + 180° and 120°.

The standard procedure as laid down in Silvicultural Code Vol. III, Chapter III has been followed. Standard definitions followed in preparing these volume tables are given for refernce in the beginning.

The present bulletin gives following set of tables :

A. Standard Volume and Allied Tables :

1. Standard stem timber in round. Solid (πr^2) Volume under bark :
   (a) by diameter and height class- table II.
   (b) by girth and height class- table III.
2. Length of standard bole :
   (a) by diameter and height class- table IV.
   (b) by girth and height class- table V.

3. Twice bark thickness at breast height and bark percentage of total volume :
   (a) by diameter & (b) by girth class. } Table VI

4. (a) Twice bark thickness and percentage in volume of logs measured over bark in round by diameter class-table VIII.
   (b) Twice bark thickness deduction to get girth of logs under bark and bark percentage in volume of logs measured O.B. in the round-table VIII.

5. Branch wood and small wood :
   (a) by diameter and height class-table IX.
   (b) by girth and height class-table X.

B. Commercial Volume and Allied Tables :

6. Abstract of commercial measurements of trees by diameter and height class-table XI.

7. Commercial stem timber in round. Solid (πr^2) volume under bark.
   (a) by diameter and height class-table XII.
   (b) by girth and height class-table XIII.

8. Length of commercial bole :
   (a) diameter height class-table XIV.
   (b) girth and height class-table XV.

9. Thin end diameter over bark of commercial bole :
   (a) by diameter class-table XVI.
   (b) by girth class-table XVII.

10. Sapwood percentage in commercial timber :
   (a) by diameter and height class-table XVIII.
   (b) by girth and height class-table XIX.

C. Total Estimated Volume :

11. Total estimated volume (Commercial timber and Fuel) :
   (a) by diameter and height class-table XX.
   (b) by girth and height class-table XXI.

The following metric system has been followed for diameter girth, height and volume measurements :

Diameter class interval-10 cms.

Height class interval-3 cms.

Girth class interval-30 cms.

Volume measurements given in tables are in cubic decimetres.

A-VOLUME TABLES FOR STANDARD TIMBER

The computations for the tables were done on the standard method given in the statistical code. The results are given in table II to X and the final curve No.1.

To ascertain if these tables could directly be applied to any localised forest area, about five trees representative of typical height and development with no unusual defects in each diameter-height class should be measured. The tables are directly applicable, if the average deviation of actual tree volumes from the corresponding volumes on final curve is of the same order as that of the basic data of these tables and the aggregate differences does not exceed :

$$\frac{2 \times \text{average deviation}}{\text{No.of trees measured}}$$

Average deviation of basic data, on which these data in table II & XII are based from the corresponding values on graph 1 & 2 has been calculated as 17.1 and 18.0 percent.

TABLE No I

Statement showing distribution of trees sampled by diameter and he

S. No.	Name of Forest Division.	HEIGHT CLASSES IN METERS																														
		9—12							12—15							15—18							18—21									
		I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III
1.	South Bastar	..	3	..	..	..	..	..	..	2	4	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
2.	East Bastar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
3.	West Bastar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	1	..	..	..	..	3	4	1	1	..	..	..	2	2
4.	North Bastar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	1	..	..	..	..	..	..	6	4	..	..	..	..	..	..	3
5.	Kanker	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	1	2
6.	East Raipur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..
7.	South Raipur	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	4	3	2	..	..	..	..	..	2
8.	North Raipur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	..	..	..	..	..	..	..	2	..	1	..	..	..	..	..
9.	South Durg	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	2	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10.	North Durg	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2	5	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..
11.	North Bilaspur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	1	..	..	..	..	..	..	3	2	..	..	..	..	..	..	2
12.	Baistar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
13.	Raigarh	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..
14.	Jashpur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
15.	North Surguja	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3	2
16.	South Surguja	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3	2	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
17.	Korea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2	1
18.	Sidhi West	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	..	..	..	..	..	..	1	3	3	..	..	..	..	..	1	2
19.	Rewa	..	2	3	..	..	..	..	..	5	2	..	..	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20.	Umaria	..	..	..	..	..	..	..	..	4	1	..	..	..	..	..	..	4	1	..	..	..	..	..	..	..	..	2	..	..	..	..	1	1
21.	South Shahdol	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	2	3	..	..	..	..	..	..	1	1	3	..	..	..	..	..	1	..
22.	North Shahdol	..	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	1	3	..	..	..	..	..	1	2
23.	Panna	..	2	..	..	..	..	..	..	3	1	1	..	..	..	..	1	1	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
24.	Chhatarpur	..	4	2	..	..	..	..	..	1	1	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25.	Jabalpur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
26.	Damoh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	1	2
27.	South Mandla	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	3	2	..	..	..	..	..	1	..
28.	Narsinghpur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	3	1	1	..	..	..	..	1	4
29.	North Balaghat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3	1
30.	Basarwar School	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1
31.	South Balaghat	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	7	..	..	..	..	..	..	..	6	3	..	..	..	..	..	..	1
32.	West Chhindwara	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	1	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..
33.	South Chhindwara	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	1	3
34.	North Seoni	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
35.	South Seoni	..	..	..	..	..	..	..	..	7	1	..	..	..	..	..	10	8	..	..	..	..	..	..	4	9	8	..	..	..	..	..	2	3
36.	Hoshangabad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37.	Harda	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	5	1	..	..	..	..	..	..	..	2	3	..	..	..	..	..	4	1
38.	Betul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	5	..	..	..	..	..	..	6
39.	North Khandwa	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	3	4	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1
40.	East Khargone	..	6	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41.	Dewas	..	2	..	..	..	..	..	..	8	2	..	..	..	..	..	6	7	2	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
42.	East Bhopal	..	4	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43.	Sagar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2	..
44.	Tikamgarh	..	..	..	..	..	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
45.	Guna	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	..	30	5	..	..	..	..	..	50	20	2	..	..	..	..	45	73	12	6	2	..	..	13	56	49	9	2	1	..	..	24	53	19

par classes divisionnaire

21—24				24—27							27—30							30—33							33—36							Total
V	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	
..	..	..	..	..	..	..	4	1	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
1	1	..	..	..	..	2	3	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
6	3	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30
2	1	..	..	..	..	1	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
1	..	..	..	..	1	6	3	2	..	..	..	..	..	2	2	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	24
..	2	1	..	..	—	..	..	1	1	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
.	..	..	..	..	2	4	1	..	..	..	..	..	..	4	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
.	..	..	..	..	2	5	2	..	..	..	..	..	..	2	..	..	..	..	1	..	..	1	..	..	..	..	1	..	..	..	..	15
.	..	..	..	..	2	3	1	1	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
.	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
.	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
.	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	—	3
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16
.	..	..	..	..	..	..	..	1	..	..	..	..	3	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	—	14
.	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
.	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	54
.	..	..	..	..	..	3	..	..	..	..	..	..	6	4	2	..	..	..	..	1	1	1	..	..	..	..	1	1	..	..	..	20
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	29
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
7	1	..	..	..	8	33	17	8	3	1	..	..	17	14	7	1	1	..	1	2	2	3	..	1	..	..	2	1	..	..	..	601

TABLE No.II

TERMINALIA TOMENTOSA

Standard stem timber in the round, Solid (πr^2) volume under bark

Diameter class d.b.h. over bark	Height class in Metres									No. of trees analysed
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36	
	Volume in cdm.									
21-30 ..	140	140	160	210	290	..	..	..	..	138
31-40 ..	(290)	340	410	510	630	770	930	..	..	187
41-50 ..	..	620	760	910	1080	1260	1460	1680	(1910)	169
51-60 ..	..	(960)	1180	1410	1640	1880	2130	2380	(2640)	69
61-70 ..	..	(1370)	1700	2010	2320	2630	2930	3220	(3510)	29
71-80 ..	..	..	..	(2700)	3220	3500	3860	4210	(4530)	6
81-90 ..	..	..	..	..	4020	4490	4960	5320	(5700)	3
Total ..	35	72	138	130	104	70	40	9	3	601

NOTE 1- Figures in brackets are based on few trees or on extra-polation of curves.

NOTE 2- The average difference between actual volumes and these based on the curves for actual average diameters and height is 1.11 percent and the aggregate difference is 1.12 percent.

NOTE 3- The standard timber includes the standard timber U.B. obtained from branches also.

TABLE No.III

TERMINALIA TOMENTOSA

Standard stem timber in round. Solid (πr^2) volume under back d/g = 0.3148

Girth class OB at 1.37 m in cms.	Hight class in Meters									No. of trees analysed
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36	
61-90 ..	130	130	130	180	..	..	..	..	..	..
91-120 ..	(270)	310	370	460	570	700	..	..	..	..
121-150 ..	..	550	680	820	980	1150	1340	1550	(1780)	..
151-180 ..	..	..	1070	1280	1490	1720	1950	2190	(2440)	..
181-210 ..	..	..	1540	1820	2110	2400	2680	2960	(3240)	..
211-240 ..	..	..	2080	2460	2830	3190	3530	3850	(4170)	..
241-270 ..	..	..	..	3190	3660	4090	4500	4880	(5230)	..
271-300 ..	..	..	..	(4580)	(5100)	5580	(6020)	(6410)	..	
No.of trees ..	35	72	138	130	104	70	40	9	3	601

NOTE 1- Figures in brackets are based on either few trees or on extra-polation of curves.

NOTE 2- The standard timber includes the standard timber U.B. obtained from the branches also.

TABLE No.IV

TERMINALIA TOMENTOSA

Length of Standard Bole

Diameter class d.b.h. over bark	Height class in Metres									No. of trees analysed
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36	
	Length in metres									
21-30 ..	3.00	5.00	7.00	8.00	..	..	..	..	..	138
31-40 ..	(4.00)	6.00	8.00	10.00	12.00	14.00	..	..	..	187
41-50 ..	..	(8.00)	9.00	11.00	13.00	15.00	15.00	20.00	20.00	169
51-60 ..	..	..	10.00	12.00	13.00	15.00	16.00	21.00	21.00	69
61-70 ..	..	..	(11.00)	13.00	13.00	16.00	18.00	21.00	21.00	29
71-80 ..	..	..	..	(14.00)	13.00	17.00	20.00	22.00	22.00	6
81-90 ..	..	..	..	..	13.00	17.00	21.00	23.00	23.00	3
Total	35	72	138	130	104	70	40	9	3	601

NOTE - Figures in bracket are based on few trees, or on extrapolation of curves.

TABLE No.V

TERMINALIA TOMENTOSA

Length of Standard Bole

Girth class at 1.37 m over bark	Height class in Metres								
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
	Length in metres								
61-90 ..	3.00	5.00	6.00	8.00	..	..	..	..	..
91-120 ..	(4.00)	6.00	7.00	9.00	12.00	14.00	..	..	..
121-150 ..	..	(8.00)	8.00	11.00	13.00	15.00	15.00	20.00	(20.00)
151-180 ..	..	..	9.00	12.00	13.00	15.00	18.00	21.00	(21.00)
181-210 ..	..	..	(10.00)	13.00	13.00	16.00	18.00	21.00	(22.00)
211-240 ..	..	..	..	14.00	13.00	16.00	19.00	22.00	22.00
241-270 ..	..	..	..	(15.00)	13.00	17.00	21.00	22.00	(22.00)
271-300 ..	..	..	..	..	(14.00)	(18.00)	(22.00)	(23.00)	(23.00)

NOTE - Figures in bracket are based on few trees or on extra-polation of curves.

TABLE No.VI

TERMINALIA TOMENTOSA

Twice bark thickness at b.h. and bark percentage of total volume

Diameter (b.h.) over bark	Twice bark thickness at b.h.	Bark percentage of total volume	Girth class b.h. over bark	Twice bark thickness at b.h.	Bark percentage of total volume
	Cms.			Cms.	
21-30 ..	3.9	30	61-90 ..	3.8	29
31-40 ..	4.5	28	91-120 ..	4.4	28
41-50 ..	5.2	27	120-150 ..	5.0	27
51-60 ..	5.9	26	151-180 ..	5.6	26
61-70 ..	6.6	25	181-210 ..	6.2	25
71-80 ..	7.2	24	211-240 ..	7.0	25
81-90 ..	7.9	23	241-270 ..	7.6	24
			271-300 ..	8.2	23

TABLE No.VII

TERMINALIA TOMENTOSA

Twice bark thickness and bark percentage in volume of logs measured over bark in round

Mid diameter of logs (over bark) Cms.	Twice bark thickness Cms.	Bark percentage	No.of logs analysed
21-30 ..	3.7	25	203
31-40 ..	4.3	23	192
41-50 ..	4.8	21	79
51-60 ..	5.3	18	27
61-70 ..	5.8	16	4
71-80 ..	6.3	14	3
81-90 ..	6.9	(12)	..
		Total	**508**

NOTE - Figures in bracket are based on extrapolation of curves.

TABLE No.VIII

TERMINALIA TOMENTOSA

Twice bark thickness, deduction to get girth of logs under bark and bark percentage in volume of logs measured over bark in round

Mid girth of log over	Twice bark thickness bark	Deduction from girth over bark to girth under bark. Twice bark thickness divided by 0.3148, the girth diameter conversion factor	Brak percentage
	Cms.	Cms.	
61-90 ..	3.6	11.4	25
91-120 ..	4.2	13.3	23
121-150 ..	4.7	14.9	21
151-180 ..	5.1	16.2	19
181-210 ..	5.6	17.8	17
211-240 ..	6.1	19.4	15
241-270 ..	6.6	21.0	13
271-300 ..	7.1	22.8	12

TABLE No.IX

TERMINALIA TOMENTOSA

Small wood and branch wood

Diameter class (b.H.) over bark	Height class in Metres								
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
	Volume in cubic decimetres								
21-30 ..	120	140	200	280	..	..	..	..	..
31-40 ..	80	200	240	280	320	380	..	..	..
41-50 ..	..	220	240	280	320	360	400	400	400
51-60 ..	..	..	240	260	300	340	380	380	380
61-70 ..	..	..	240	240	300	320	380	380	380
71-80 ..	..	..		240	300	320	380	380	380
81-90 ..	..	..	..	..	280	320	380	360	360

CURVE No. 1.

TERMINALIA TOMENTOSA,

Diameter/Standard stem timber volume in round Girth.

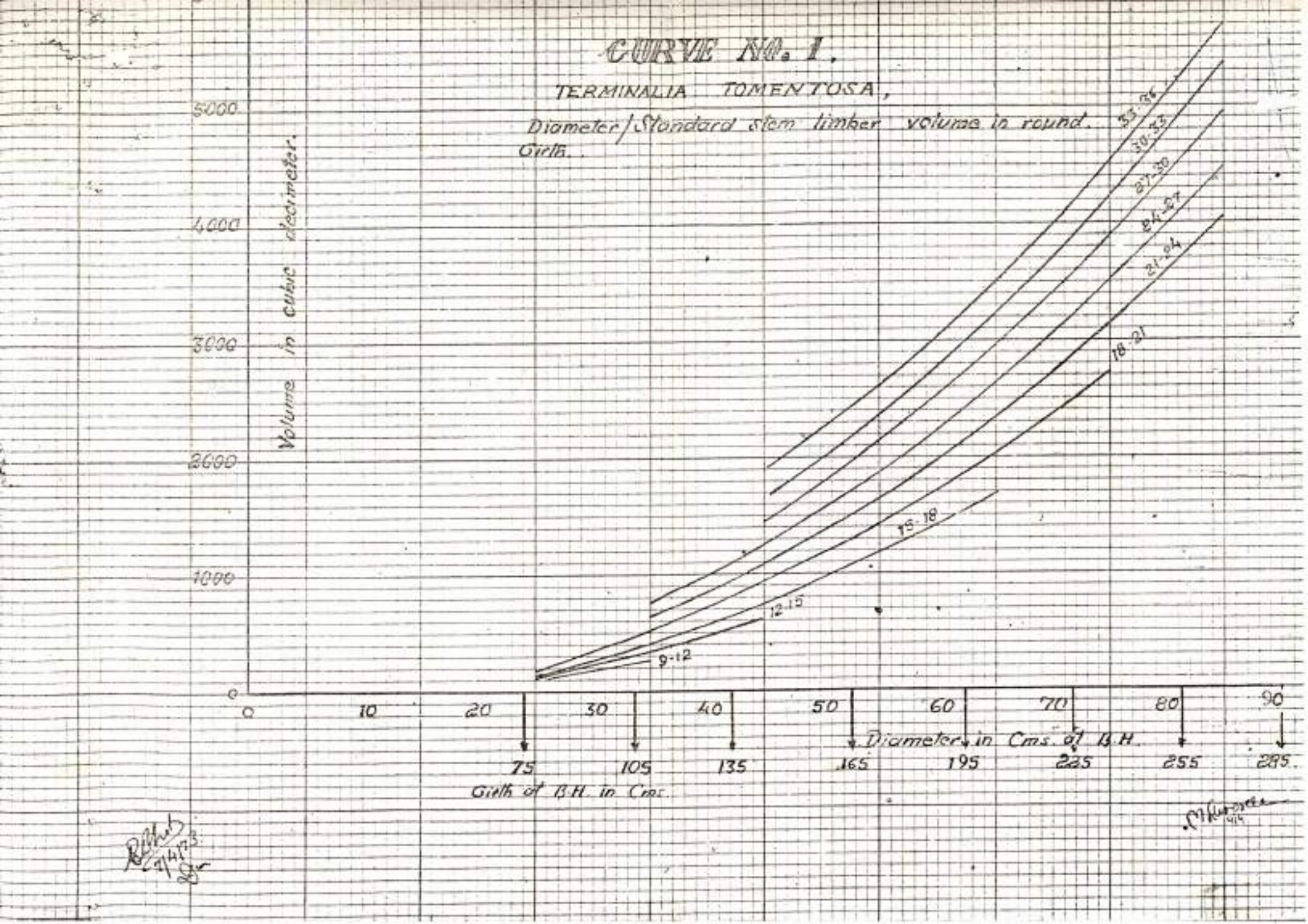


TABLE No.X

TERMINALIA TOMENTOSA

Small wood and branch wood

Girth class (b.h.) over bark	Height class in Metres								
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
	Volume in cubic decimetres								
61-90 ..	120	140	200	280	..	..	..	..	..
91-120 ..	80	200	240	280	320	380	..	..	..
121-150 ..	..	220	240	280	320	360	400	400	400
151-180 ..	..	..	240	260	300	340	380	380	380
181-210 ..	..	..	240	240	300	320	380	380	380
211-240 ..	..	..	240	240	300	320	380	380	380
241-270 ..	..	..	..	240	280	320	380	360	360
271-300 ..	..	..	..	..	280	320	360	360	360

B. - VOLUME TABLE FOR COMMERCIAL TIMBERS

The general volume tables for commercial timber are based on 601 single tree measurements. Table XI gives an abstract about the distribution of these measurements. The results are given in Table XII to XIX based on the final graph.

The commercial outturn from a tree depended on many factors one of which and also the most important is the market requirement. Generally logs of 3 meter length are extracted and as such commercial tables have been prepared taking this length into consideration. Tables XIV and XVII which deal with length of commercial bole and thick and thinend diameter of commercial bole for different diameter class trees, respectively give rough idea about the extent of commercial outturn from trees of different sizes.

TABLE No.XI

TERMINALIA TOMENTOSA

Abstract of Commercial measurements of trees by diameter and height classes

Diameter classes d.b.h. over bark	Height classes in Metres									No. of trees measured
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36	
21-30 ..	30	50	45	13	..	..	..	..	..	138
31-40 ..	5	20	73	56	24	8	..	1	..	187
41-50 ..	..	2	12	49	53	33	17	2	..	168
51-60 ..	..	..	6	9	19	17	14	2	2	69
61-70 ..	..	..	2	2	7	8	7	3	..	29
71-80 ..	..	..	..	1	1	3	1	..	1	7
81-90 ..	..	..	..	..	..	1	1	1	..	3
Total ..	35	72	138	130	104	70	40	9	3	601

TABLE No.XII

TERMINALIA TOMENTOSA

Commercial stem timber in round solid (πr^2) volume under bark

Diameter class at 1.37 m. over bark	Height classes in metres									No.of tree measured
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36	
21-30 ..	80	130	190	270	..	..	..	..	..	138
31-40 ..	(130)	210	310	420	540	670	..	..	..	187
41-50 ..	..	(320)	460	610	760	920	1100	1270	(1460)	168
51-60 ..	..	..	650	850	1050	1250	1450	1660	(1870)	69
61-70 ..	..	..	(880)	(1130)	(1390)	1630	1880	2120	(2350)	29
71-80 ..	..	..	..	(1470)	(1780)	2080	2380	2660	(2930)	7
81-90 ..	..	..	..	..	(2240)	(2600)	(2950)	(3270)	(3590)	3
Total ..	35	72	138	130	104	70	40	9	3	601

NOTE 1-Figures in bracket are based on few trees or on extrapolation of curves.

NOTE 2-The average difference between actual volumes and these based on the curves for actual average diameters and height is 0.52 percent and the aggregate difference is 0.51 percent.

TABLE No.XIII

TERMINALIA TOMENTOSA

Commercial stem timber in round solid (πr^2) volume under bark

Girth class (at 1.37 m.) B.H.	Height classes in metres								
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
61-90 ..	80	120	180	260	..	..	..	..	..
91-120 ..	(120)	200	290	390	510	630	..	..	..
121-150 ..	..	(300)	430	510	710	870	1030	1200	(1390)
151-180 ..	..	..	600	780	970	1160	1360	1560	(1760)
181-210 ..	..	..	810	1050	1280	1510	1740	1980	(2210)
211-240 ..	..	..	1050	1350	1640	1920	2200	2470	(2730)
241-270 ..	..	..		(1700)	(2050)	(2390)	(2720)	(3030)	(3330)
271-300 ..	..	..	..	(2090)	(2510)	(2910)	(3290)	(3650)	(3990)

NOTE - Figures in bracket are based on extrapolatation of curves.

TABLE No.XIV

TERMINALIA TOMENTOSA

Length of Commercial bole

Diameter class (at1.37m.) over bark	Height classes in metres									Total No. of trees measured
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36	
	Length in Metres									
21-30 ..	2.00	5.00	6.00	8.00	..	..	..	..	..	138
31-40 ..	(2.00)	5.00	6.00	8.00	8.00	10.00	..	..	..	186
41-50 ..	..	(5.00)	6.00	7.00	8.00	10.00	12.00	12.00	(12.00)	170
51-60 ..	..	..	6.00	7.00	8.00	9.00	11.00	11.00	(11.00)	68
61-70 ..	..	..	(6.00)	7.00	8.00	8.00	10.00	10.00	(10.00)	29
71-80 ..	..	..	..	(7.00)	8.00	8.00	9.00	9.00	(9.00)	3
81-90 ..	..	..	..	..	(8.00)	(8.00)	(8.00)	(8.00)	(8.00)	..
Total ..	35	72	138	129	103	69	38	7	3	594

NOTE1 - Figures in bracket are based on few trees or on extrapolation of curves.

TABLE No.XV

TERMINALIA TOMENTOSA

Length of Commercial bole

Girth class (at 1.37 m.) B.H. over bark	Height classes in metres								
	9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
	Length in Metres								
61-90 ..	2.00	5.00	6.00	9.00	..	..	..	..	..
91-120 ..	(2.00)	5.00	6.00	8.00	9.00	10.00	..	..	..
121-150 ..	..	(5.00)	6.00	7.00	8.00	10.00	12.00	14.00	(15.00)
151-180 ..	..	..	6.00	7.00	8.00	10.00	11.00	13.00	(14.00)
181-210 ..	..	..	(6.00)	6.00	8.00	9.00	11.00	12.00	(13.00)
211-240 ..	..	..	..	(6.00)	8.00	9.00	10.00	11.00	(12.00)
241-270 ..	..	..	..	..	7.00	8.00	9.00	10.00	(11.00)
271-300 ..	..	..	..	..	(7.00)	(8.00)	(9.00)	(9.00)	(10.00)

NOTE - Figures in bracket are based on few trees or on extrapolation.

TABLE No.XVI

TERMINALIA TOMENTOSA

Thin end diameter over bark of commercial bole

Diameter class (b.h.) O.B. of trees Cms. (1)	Thin end diameter Cms. (2)	No.of trees measured (3)
21-30	20.1	129
31-40	27.0	183
41-50	32.7	170
51-60	40.6	68
61-70	47.5	29
71-80	51.4	4
81-90	(58.2)	..
	Total	**583**

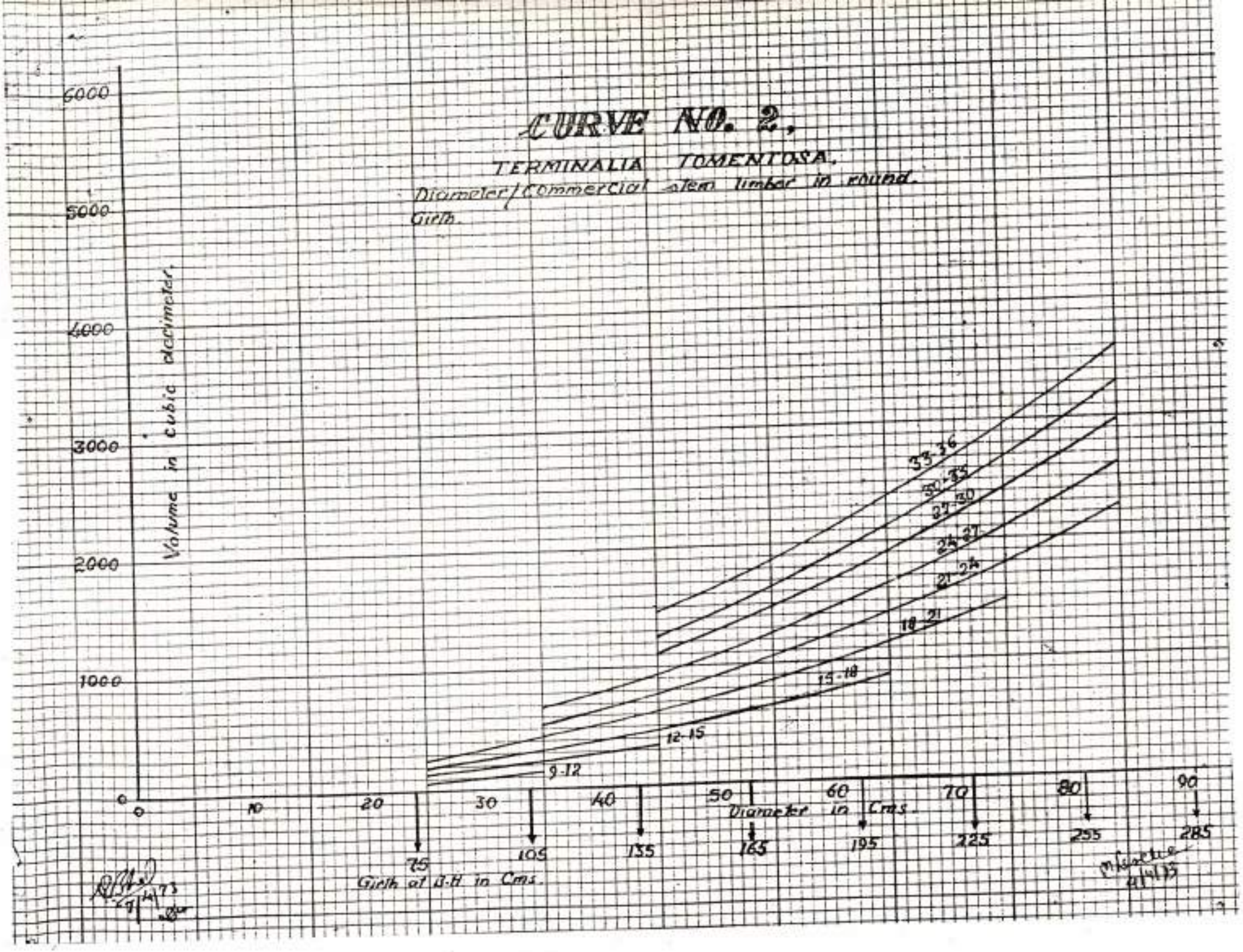
NOTE -The reason for the steady increase in thin end diameter with the increase of breast height diameter is that conversion usually corresponds with the formation of real crown of the trees.

TABLE No.XVII

TERMINALIA TOMENTOSA

Thin end girth over bark of commercial bole

Girth class at (1.37 m.) over bark Cms.	Thin end girth Cms.
61-90	61.0
91-120	82.0
121-150	102.0
151-180	123.5
181-210	143.5
211-240	164.8
241-270	185.7
271-300	206.4


CURVE NO. 2.
TERMINALIA TOMENTOSA.
Diameter/Commercial stem timber in round.
Girth.
Volume in cubic decimeter.
6000
5000
4000
3000
2000
1000
0
10
20
30
40
50
60
70
80
90
75
105
135
165
195
225
255
285
Girth at B.H. in Cms.
Diameter in Cms.
33-36
30-33
27-30
24-27
21-24
18-21
15-18
12-15
9-12

C-TOTAL ESTIMATED VOLUME

Total estimated volume of timber and fuel for different diameter and height class have been given in table XX and XXI. The tables have been prepared on the basis of nformation given in tables II, III, IX, X, XII & XIII.

TABLE No.XX

TERMINALIA TOMENTOSA

Total estimated volume (Timber and fuel)

Diameter class at B.H.OB.		Height classes in metres								
		9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
		Volume in cubic decimeters								
21-30	T	80	130	190	270					
	F	180	150	170	220					
	T + F	260	280	360	490					
31-40	T	130	210	310	420	540	670			
	F	240	330	340	370	410	480			
	T + F	370	540	650	790	950	1150			
41-50	T		320	460	610	760	920	1100	1270	1460
	F		520	540	580	640	700	760	810	850
	T + F		840	1000	1190	1400	1620	1860	2080	2310
51-60	T			650	850	1050	1250	1450	1660	1870
	F			770	820	890	970	1060	1100	1150
	T + F			1420	1670	1940	2220	2510	2760	3020
61-70	T			880	1130	1390	1630	1880	2120	2350
	F			1060	1120	1230	1320	1430	1480	1540
	T + F			1940	2250	2620	2950	3310	3600	3890
71-80	T				1470	1780	2080	2380	2660	2930
	F				1480	1640	1740	1860	1930	1980
	T + F				2950	3420	3820	4240	4590	4910
81-90	T					2240	2600	2950	3210	3590
	F					2060	2210	2390	2410	2470
	T + F					4300	4810	5340	5680	6060

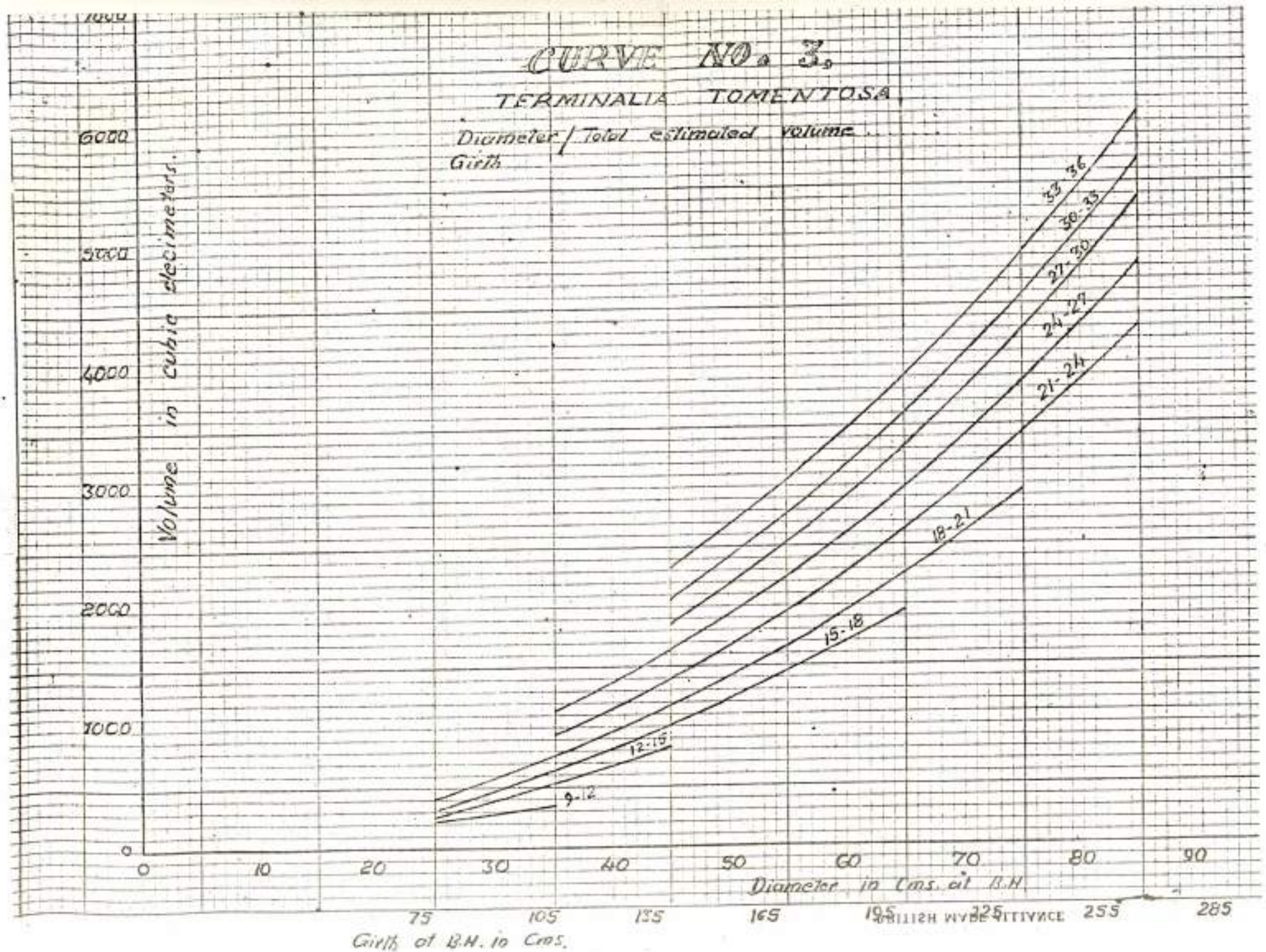
T = Timber F = Fuel

TABLE No.XXI

TERMINALIA TOMENTOSA

Total Estimated Volume (Timber and Fuel)

Girth class at 1.37 m overbark		Height classes in metres								
		9-12	12-15	15-18	18-21	21-24	24-27	27-30	30-33	33-36
61-90	Timber	80	120	180	260					
	Fuel	170	150	150	220					
	Total	250	270	330	480					
91-120	Timber	120	200	290	390	510	630			
	Fuel	230	310	320	350	380	450			
	Total	350	510	610	740	890	1080			
121-150	Timber		300	430	570	710	870	1030	1200	1390
	Fuel		470	490	530	590	640	710	750	780
	Total		770	920	1100	1300	1510	1740	1950	2180
151-180	Timber			600	780	970	1160	1360	1560	1760
	Fuel			710	760	820	900	970	1010	1060
	Total			1310	1540	1790	2060	2330	2570	2820
181-210	Timber			810	1050	1280	1510	1740	1980	2210
	Fuel			970	1010	1130	1210	1320	1360	1410
	Total			1780	2060	2410	2720	3060	3340	3620
211-240	Timber			1050	1350	1640	1920	2200	2470	2730
	Fuel			1270	1350	1490	1590	1710	1760	1820
	Total			2320	2700	3130	3510	3910	4230	4550
241-270	Timber				1700	2050	2390	2720	3030	3330
	Fuel				1730	1890	2020	2160	2210	2260
	Total				3430	3940	4410	4880	5240	5590
271-300	Timber				2090	2510	2910	3290	3650	3990
	Fuel				2200	2390	2550	2650	2730	2780
	Total				4290	4900	5460	5940	6380	6770


CURVE No. 3.
TERMINALIA TOMENTOSA
Diameter / Total estimated volume ....
Girth
Volume in cubic decimeters.
6000
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
60
70
80
90
Diameter in Cms. at B.H.
75
105
135
165
195
225
255
285
Girth at B.H. in Cms.
33-36
30-33
27-30
24-27
21-24
18-21
15-18
12-15
9-12
BRITISH WIRE ATTIVANCE

COMPUTATIONAL METHODS

(a) The Individual Tree Volumes

(1) Sectional area corresponding to the average mid-diameter of each section is calculated to 4 decimal places.

(2) Volume of each section has been calculated by multiplying sectional area by length of section correct to two decimal places.

(3) Timber or small wood volumes has been obtained by totalling the volume of the sections measured.

(b) Grouping, Averaging and Tabulating

(a) By height and diameter classes.

(4) The following diameter and height class intervals have been adopted to form grouping units :

Diameter class		Height class
21-30 Cms.	..	9-12 Metres
31-40 Cms.	..	12-15 Metres
41-50 Cms.	..	15-18 Metres
51-60 Cms.	..	18-21 Metres
61-70 Cms.	..	21-24 Metres
71-80 Cms. and	..	24-27 Metres
81-90 Cms.	..	27-30 Metres
		30-33 Metres and
		33-36 Metres

(5) All the available data was collected by the above mentioned height and diameter classes on the standardised Form No.4.

(6) For each diameter height group, the following diameter height averages were computed :-

(i) D.b.h.

(ii) Total height.

(iii) Length of the bole (Standard or commercial).

(iv) Timber volume (Standard or commercial).

(v) Small wood volume.

(vi) Form factors.

(vii) Miscellaneous data such as thin end diameter.

(7) For each height group (class) average height was calculated.

(8) With these diameter height averages, together with the number of trees on which they are based "table of basic averages" by diameter and height classes was prepared.

Curves and Tables

On this basic averages tables are based on various regression equations which were derived after fitting in various curves. The various tables are based on these regression equations. A few tables are based simply on the basic averages.

The details about various tables are given below :-

For tables II and XII regression method of computation has been followed. For standard stem timber volume and commercial volume, regression equation were fitted to the basic data. The relation between basal area of trees and the corresponding volumes in different height classes for the whole range of diameter was found to give linear trend.

$$Y = a + b X$$

Where Y = the volume of the tree

a = constant

b = coefficient

X = the basal area of the tree

Various regression constants and coefficients for different height classes are listed below :-

Height class in metres	Standard timber volume		Commercial volume	
	Regression coefficient	Regression constant	Regression constant	Regression coefficient
9-12	- 71.0555	+ 32.195	+ 41.6017	+ 5.9891
12-15	- 94.6840	+ 48.441	+ 32.1446	+ 22.0237
15-18	- 35.4910	+ 51.161	+ 71.5880	+ 26.9240
18-21	- 65.2220	+ 62.522	+ 147.2485	+ 30.8112
21-24	- 47.4140	+ 69.333	+ 125.5251	+ 36.7669
24-27	+ 179.3160	+ 71.391	+ 319.9756	+ 35.3860
27-30	- 85.7220	+ 92.845	+ 516.4476	+ 40.3008
30-33	- 8.3700	+ 99.355	+ 270.8154	+ 57.9031
33-36	+ 633.3430	+ 84.600	+ 718.7216	+ 49.8841

Further for harmonization of curve a second degree fit was done for all the above coefficient and constants against height.

The equations are as under :

1. $y = - 19.6722 + 0.5615752\ h - 0.000688313\ h^2$

   Regression coefficient for standard timber.

2. $y = + 493.2347 - 6.8350h + 0.0193\ h^2$

   Regression constant for standard timber

3. $y = - 20.6993 + 0.32854h - 0.0003412\ h^2$

   Regression coefficient for commercial timber.

4. $y = + 133.5973 - 1.9946083h + 0.0099695\ h^2$

   Regression constant for commercial timber.

The final values of constant and coefficient so obtained are as under :

Height class in metres	Standard timber		Commercial timber	
	Regression constant	Regression coefficient	Regression constant	Regression coefficient
9-12 ..	- 11.6578	+ 31.7617	+ 34.0771	+ 10.1339
12-15 ..	- 77.7478	+ 43.6905	+ 46.0193	+ 17.5334
15-18 ..	- 109.0978	+ 54.3895	+ 75.9065	+ 24.3188
18-21 ..	- 105.7078	+ 63.8590	+ 123.7389	+ 30.4901
21-24 ..	- 67.5778	+ 72.0987	+ 189.5163	+ 36.0471
24-27 ..	+ 5.2922	+ 79.1090	+ 273.2389	+ 40.9901
27-30 ..	+ 112.9022	+ 84.8895	+ 374.9065	+ 45.3188
30-33 ..	+ 255.2522	+ 89.4404	+ 494.5193	+ 49.0334
33-36 ..	+ 432.3422	+ 92.7616	+ 632.0771	+ 52.1339

Table IV & XIV - For each height class diameters length of standard boles and commercial bole relationship was found to be linear. The various constants and coefficient are as listed below :

Height class	Standard bole		Commercial bole	
	a	b	a	b
9-12 ..	- 1.158	+ 0.158	+ 1.317	+ 0.035
12-15 ..	+ 0.617	+ 0.167	+ 4.782	+ 0.003
15-18 ..	+ 4.000	+ 0.101	+ 6.780	- 0.017
18-21 ..	+ 5.390	+ 0.119	+ 10.700	- 0.079
21-24 ..	+ 11.750	+ 0.019	+ 9.180	- 0.022
24-27 ..	+ 11.606	+ 0.066	+ 10.850	- 0.029
27-30 ..	+ 7.360	+ 0.166	+ 14.946	- 0.070
31-33 ..	+ 17.950	+ 0.054	+ 19.410	- 0.117
33-36 ..	+ 40.740	+ 0.455	+ 25.500	- 0.238

Table VI - Diameter/Twice bark thickness and Diameter/bark percentage of total volume relationship was found to be linear. The various constants and coefficients are as listed below :

a	b	a	b
+ 1.100	0.0335	+ 24.200	- 0.090

Table VII - Diameter/Twice bark thickness and Diameter/bark percentage in volume of logs O.B. relationships were found to be linear. The various constants and coefficients are as listed below :

a	b	a	b
- 2.438	+ 0.948	- 0.212	+ 30.111

Table IX - Simple average of the basic data from the basis of the results in this tables.

Table XVI - Diameter/Thin end diameter of commercial bole relationship was found to be linear. The various constants and coefficients are as listed below :

a	b
+ 2.920	+ 0.685

Table XVIII - Sapwood percentage in commercial timber are based on the simple averages from the basic data.

APPLICABILITY OF TABLES

To determine the applicability of these tables to a given locality or coupe, the procedure generally given under the head on standard volume tables should be followed.

An example is given below for ready reference in carrying out this check.

Example - Measurements of 13 trees of *Terminalia Tomentosa* were made for standard and commercial timber in South Bastar Forest Division. It is required to test whether the present tables are applicable.

S.No. of tree	D.B.H. in	Total height Cms.	Standard stem timber volume in Cdm.			Commercial timber volume in Cdm.		
			Actual volume	From curve	Difference	Actual volume	From curve	Difference
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	24.0	10.5	90	132	42	80	80	..
2.	28.5	14.0	240	201	39	190	158	32
3.	21.8	12.5	60	85	25	60	111	51
4.	33.8	14.8	290	314	24	130	203	73
5.	31.6	14.7	260	265	5	170	184	14
6.	34.3	14.5	330	326	4	320	208	112
7.	33.7	13.5	330	312	18	290	202	88
8.	52.0	17.5	1330	1046	284	770	592	178
9.	38.3	22.5	600	763	163	480	605	125
10.	50.1	25.5	1490	1565	75	1030	1081	51
11.	59.3	26.5	2030	2190	160	1410	1405	5
12.	52.2	25.5	1330	1698	368	750	1150	400
13.	67.2	28.5	2590	3124	674	1760	1982	222
Total	..	..	10970	12021	1881	7440	7961	1351

(A) Standard Stem Timber Volume

$$\text{Aggregate difference} = \frac{10970\text{-}12021 \times 100}{12021}$$

$$= 8.74 \text{ percent}$$

$$\text{Average deviation} = \frac{1881 \times 100}{12021}$$

$$= 15.6 \text{ percent}$$

Average deviation of the basic data

$$= 17.1 \text{ percent}$$

$$\frac{2 \times \text{Average deviation}}{\sqrt{n}} = \frac{2 \times 17.1}{\sqrt{13}}$$

$$= 9.5 \text{ percent}$$

The average deviation of the tree volume from corresponding values on the curve is 15.6 percent which is less than and of the same order as that of the tables, and basic data. The aggregate difference is less than the quantity $\frac{2 \times A.D}{\sqrt{n}}$

Hence the standard stem timber volume tables are directly applicable to the locality.

(B) Commercial Timber Volume

$$\text{Aggregate difference} = \frac{7440\text{-}7961 \times 100}{7961}$$

$$= 6.54 \text{ percent}$$

$$\text{Average deviation} = \frac{1351 \times 100}{7961}$$

$$= 17 \text{ percent}$$

Average deviation of the basic data

$$= 18 \text{ percent}$$

$$\frac{2 \times \text{Average deviation}}{\sqrt{n}} = \frac{2 \times 18}{\sqrt{13}}$$

$$= 10 \text{ percent}$$

The average deviation of the commercial tree volumes from corresponding values on the curve is 17 percent. Which is of the same order as that of the table and basic data. The aggregate difference is less than the quantity

$$\frac{2 \times A.D.}{\sqrt{n}}$$

Hence the commercial volume tables are directly applicable to the locality.

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