

Field Manual for Assessment of Trees Outside Forests

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Chapter I

1.0 Introduction:

An accurate assessment of forest and tree resources is essential for formulating sound strategy for forestry sector. Precise data and latest information on forest cover and volume of growing stock of forests/trees and trends of changes therein are basic ingredients for policy and planning purposes.

Extensive tree wealth exists outside notified forest areas in our country, termed as ‘Trees Outside Forests’ (TOF). These are in the form of small woodlots and block plantations, naturally growing vegetation along streams and on community/ private/ government lands, trees along linear features, such as roads, canals bunds, etc. and scattered trees on farmlands, homesteads, community lands and urban areas. Traditionally, these were not inventoried and little quantitative information is existing about TOF. However, lately a lot of interest has been generated worldwide on TOF. Besides providing support to rural economy, these trees are now a source of substantial forest produce. ToF is traditionally contributing to the various wood and non-wood requirements of the households and the industries. These trees also perform multifarious functions like adding soil fertility, providing food security, providing income, check runoff and erosion from water and wind, supply of pulp, fuelwood, timber etc.

Many Indian States, including Andhra Pradesh, are endowed with rich Tree and Forest Cover outside the Notified Forests. As per the assessment made by Forest Survey of India (SFR2005), it is estimated that out of 44372 km² of total Forest Cover, 6183 km² of forest cover is outside the notified forests; constituting 2.25% of the total geographical area and 13.93% of the total forest cover of the State, “a substantial amount”. It is exclusive of the tree cover.

Tree population along avenues has been taken up extensively since early 1950s mainly along roads, railway tracks, bunds, canals, riverbanks, in parks, in blocks and other blank areas. Farm forestry, agro-forestry and wasteland afforestation activities have subsequently increased the tree wealth of the state.

1.1 Objectives of the assessment of trees outside forests:

The main objectives of the field inventory are to collect qualitative and quantitative information about the trees outside forest resources within precision limits in preparing reports to serve data needs of development planning.

- To estimate the total number of trees in TOF
- To estimate the volume of standing trees outside the forest area.
- To estimate carbon sequestered in TOF
- To evaluate the role of TOF in the context of timber production
- To evaluate the role of TOF in the context of fuel wood, fodder and NTFP.
- To estimate the contribution of TOF in tree cover
- for developing management options to maintain tree cover and plan wood production

1.2 Definitions (FAO 2001)

A clear definition of TOF is required in order to guarantee consistency and comparability among data sets, and to facilitate communication. A definition should provide information for local and/or national needs and should make it easier to fulfill commitments at various levels.

Tree:	A woody perennial with a single main stem, or in the case of coppice with several stems, having a more or less definite crown, having diameter 10 cm or more at breast height (1.37m). If there are stems below 1.37 m height then individual branch/stem which has attained 10 cm DBH will be considered as individual tree. It also includes bamboo, palms, coconut, neem, peepal, fruit trees etc.
Forest:	Land with tree crown cover (or equivalent stocking level) of more than 10 % and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity in situ. May consist of either closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground, or open forest formations with a continuous vegetation cover, in which tree crown cover exceeds 10 %. Young natural stands and all plantations established for forestry purposes which have yet to reach above criteria are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention or natural causes but which are expected to revert to forest.
Other Wooded Land	Land with either a crown cover (or equivalent stocking level) of 5 to 10 % of trees, able to reach a height of 5 m at maturity in situ; or a crown cover (or equivalent stocking level) of more than 10 % of trees not able to reach a height of 5 m at maturity in situ (e.g. dwarf or stunted trees); or with shrub or bush cover of more than 10 %.
TOF:	Trees on land not defined as forest and other wooded land. Includes: trees on land that fulfils the requirements of forest and other wooded land except that the area is less than 0.5 ha; trees able to reach a height of at least 5 m at maturity in situ where the stocking level is below 5 %; trees not able to reach a height of 5 m at maturity in situ where the stocking level is below 20 %; scattered trees in permanent meadows and pastures; permanent tree crops such as fruit-trees and coconuts; trees in parks and gardens, around buildings and in lines along streets, roads, railways, rivers, streams and canals; trees in shelterbelts of less than 20 m width and 0.5 ha area.

1.3 Classification of ToF

ToF Classification is required to better understand the structure and composition of the resource. It facilitates uniformity in resource evaluation and comparability of inventory results. A formal classification system is particularly necessary to enable presentation on maps, where not every single tree can be depicted, for large areas.

The objective of classification is to group together a set of observational units on the basis of their common attribute (Coker, 2001). A classification should be a set of groups derived from the units of observation where, units within a group share more attribute with one another than with units in other groups (NBS, 2000).

Hybrid approach is adopted to classify TOF areas. CARTOSAT 1 PAN data is used to stratify the area into various homogeneous units based on the combination of possible diagnostic criteria and subsequently these classes are verified in the field and classes were merged based on the similarity in the samples. The classification may be different for each district, because of the species variation in each district.

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The classification scheme adopted is

1. **Natural Forests** (polygons) growing on private/ community/ government lands and along streams, nallahs, tank foreshores
 - a. Very Dense Forest (>70% Canopy Cover)
 - b. Moderately Dense Forest (70 – 40 % Canopy Cover)
 - c. Open Forest (40 – 10 % Canopy Cover)
 - d. Scrub Forest (<10% Canopy Cover)
2. **Manmade Forests** (polygons)
 - a. Teak
 - b. Eucalyptus
 - c. Mango
 - d. Sapota
 - e. Cashew
 - f. Bamboo
 - g. Miscellaneous
 - h. any other species found during ground verification
3. **Habitations** (polygons) – Stratification of the habitations will be made based on area or population. However, geographical area, which is readily available with imagery, is considered.
 - a. **Urban** -
 - i) Area more than 50 Km²
 - ii) Area between 50 to 35 Km²
 - iii) Area between 35 to 20 Km²
 - iv) Area between 20 to 10 Km²
 - v) Area between 10 to 5 Km²
 - b. **Rural**
 - i. Area between 5 to 3 km²
 - ii. Area between 3 to 1 km²
 - iii. Area between 1 km² to 50 ha
 - iv. Area between 50 ha to 25 ha
 - v. Area less than 25 ha
4. **Linear Plantations** (lines)
 - a. Along roads
 - b. Along canal banks
 - c. Along railway tracks
5. **Scattered trees**

Chapter II

Methodology for TOF Inventory

2.1 Sampling Design for various classes

Sampling is the process of obtaining information by examining only a part of the population to draw conclusion about the whole. The procedure by which the samples are selected from the population is called sampling design. The inventory of the whole population requires large amount of money, time and qualified personnel. Due to the limitations of time money and qualified personnel, sampling is the best solution to obtain the required information (De Gier). To achieve the objectives of this research purposive stratified random sampling method was used for field data collection.

The sampling design is finalized by the Geomatics Center. The maps, showing the locations (longitude and latitude in Indian Bangladesh datum) overlaid on topomaps where the detailed inventory is to be made, will be given from Geomatics Center. For the enumeration purpose, each district is chosen as a primary sampling unit. As discussed in Chapter 1.3, the entire district is stratified into various homogeneous units using the high resolution CARTOSAT 1 PAN Imagery. The sampling frame (Sample Size, Number of Samples, Size of the Sampling Unit, Sampling Intensity) for each Stratum was decided by intensive field visits made by the Officers of the Geomatics Center and also in consultation with senior officers & other field officers of the department. It is decided

- *To have more number of samples with smaller size than few bigger samples, since more samples cover more area and better accuracy is achieved. It also meets the criteria of optimal sample size with same resources and time.*
- *To adopt FSI method, as nearly as possible, for easy comparison and acceptance from other organizations.*
- *To collect more parameters, but as simple as possible, if time and resources permits.*

1. **For Natural Class:** since the tree cover is similar to that of notified forest areas, the regular inventory methodology used for Forest areas will be adopted for this category. Two stage sampling - *Pre-inventory and final-inventory method will be adopted.*

- i. The number of sample points required N_{required} will be estimated using probability proportionate stratified random sampling method (Probability Proportionate to area). Sampling intensity expected will be 0.01 %.
- ii. Initially Pre-inventory @ 15 points randomly selected from 1(i) for each class will be conducted. Based on variance in the population, the number of sample points N_{required} will be estimated using t-distribution @ allowable error 20% for carrying out the final inventory.
- iii. Maximum of (i) and (ii) will be considered as N_{required}
- iv. The information collected during pre-inventory will be reused in generation of final statistics.
- v. 0.1 Ha sample plot will be adopted for pre-inventory and final inventory.
- vi. The information has to be collected in the Plot approach/ Description and Plot Enumeration forms.

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2. **For Block Plantations:** The crop in a block is generally uniform in nature in terms of age and species in 90% of the cases.
 - i. The number of sample points N_{required} will be estimated using probability proportionate stratified random sampling method.
 - ii. *Sampling intensity is 0.1%.*
 - iii. The information has to be collected in the Plot Enumeration and Plot approach/ Description forms.
3. **For Habitations Rural:** Villages will be stratified based on the geographical area or population (which is adopted by FSI).
 - i. Area stratification will be adopted since it is readily available from imagery.
 - ii. *The classes adopted are - Area between 5 to 3 km², 3 to 1 km², 1 km² to 50 ha, and 50 ha to 25 ha and area less than 25 ha.*
 - iii. 6-10 samples (villages) in each class will be selected using Stratified Random Sampling Technique. Total enumeration will be done in each selected sample.
 - iv. The information has to be collected in the Plot approach/ Description and Plot Enumeration forms.
4. **For Habitations Urban:** Area based stratification will be adopted similar to rural areas, since areas are readily available from the imagery.
 - i. *The classes adopted are - Area more than 50 km², Area between 50 to 35 km², 35 to 20 km², 20 to 10 km², 10 to 5 km². Sample frame will be generated.*
 - ii. Habitations will to be divided into segments using systematic grid or based on the manmade/natural features. Segments will be selected randomly for carrying out enumeration @ 0.1% sampling intensity. Total enumeration will be done in the selected segments and extrapolated to entire area.
 - iii. The information has to be collected in the Plot approach/ Description and Plot Enumeration forms.
5. **For linear plantations:** the FSI method of using 125 m length * 10 m width sample plot is ideal, with 1% sampling intensity. The information has to be collected in the Tree and Plot approach forms.
6. **For Scattered Trees:** Individual trees also contribute substantially towards TOF. Counting the number of trees on screen is cumbersome and may be prone to errors.
 - i. 60 samples plots as suggested by FSI will be selected randomly. The sample size to be adopted is 3 Ha.
 - ii. The information has to be collected in the Plot approach/ Description and Plot Enumeration forms

The random points generated in the above process will be overlaid on the topmaps which will be supplied to the field officers, along with geographic coordinates in Indian Bangladesh datum, for carrying out the enumeration.

Chapter III

Organization of Field work & collection of data in field

3.1 Executive Arrangement:

The field duties of personnel engaged in the field work are as follows:

S No	Designation	No	Nature of duties
1	Group Leader DFO/ ACF/ Sub DFO (T/WL)	1	<ol style="list-style-type: none">1. Over all supervision & organization of fieldwork.2. Supply of copies of manual to parties and explaining it to them3. Supply of stores to staff4. Planning of base camps & field camps5. Checking and compilation of data and forwarding data to Data Entry Section at Division Office
2	DFO/ ACF/ Sub DFO/ FRO (T/WL)		<ol style="list-style-type: none">1. Random checking of field work.2. Management of base camp.3. Organization of field work.4. Transmission of inventory data to PCCF Office.
3	Crew leaders Dy.RO/ FSO	1	<ol style="list-style-type: none">1. Study of field manual.2. Conducting of field inventory and Collection of data in forms at each sample plot as per the instructions contained in the field manual.3. Maintenance of account & cash book of field work4. Checking and supply of data for submission to the Division Office.5. Safe custody of maps and equipment
4	Asst. Crew leader	1	Assisting the crew leader in all above activities
5	Field botanist	1	Identification of trees and helping in other data recording activities.
6	Local Staff	1	Assist the inventory crew
7	Field Assistants	4	Helping in total process of plot layout & data recording

The allotment of jeeps, drivers, field kit, consumable stores, medicine, blank forms, field instructions etc will be decided by the DFO (T) depending upon the availability of staff. The assignment of duties to various ranks is also left at the discretion of the Group Leaders as the entire work is based on teamwork and defining precise duties for the staff is not feasible. The members of the crew have to be assigned works by the Crew Leaders considering their experience, knowledge and capacity to work. These assignments may vary from time to time.

3.2 Field Equipments

The following equipment and maps are to be carried by each field party.

Equipment	No	Use
GPS	1	For navigating to the plot and recording at plot center and corner.
Compass	1	Plot layout.
Measuring line	1	For plot layout.
Flags	5	For marking corners and centre.
Calipers	2	For measuring diameter of the trees.
Tape	1	For plot layout.
Ravi Altimeter	1	For measuring height of trees
Wedge Prism	1	For measuring Basal Area
Crow bar	1	For planting flags at corners.
Axe/ Bill hooks	2	For clearing bushes
Marking pens/ paint		As per requirement
Field forms and board, field manual, Maps/ imageries, Bag/haversack, Note book, pencil, eraser, ball pen, Scale, protractor		As per requirement

3.3 Maps to be used During Survey:

The maps showing the locations, where the detailed inventory to be conducted overlaid on topographic maps of 1:50K scale, shall be carried by each field party. The crew leader shall ensure that all the maps are returned back to the Division level Designated Officer after the completion of field inventory.

3.4 General Instructions to the Crew Leaders:

The in-charge Officer will distribute the work of TOF inventory to the crews. The Crew Leaders should select their camping sites in such a manner that maximum number of sample points can be covered from a camp in minimum traverse of distance. They should see that the day-to-day programme is so chalked out that they are not required to make wasteful journeys and will submit their programme to the base camp in-charge officer. They should see that they and their party are fully equipped with stores, camp and survey equipment, ration, medicine etc before commencement of the fieldwork. They should also see that adequate field forms are carried to field, each member has understood the field manual thoroughly; and the work to be done and all doubts regarding fieldwork are fully cleared. They should see that they carry minimum required equipment and kit with them in field as well as in camps so that there is no problem of transport of voluminous luggage. As a general routine, Crew Leaders should keep good liaison with the local staff and see that the camps are properly, neatly and systematically arranged; and the staff maintains decorum and proper discipline in the camps.

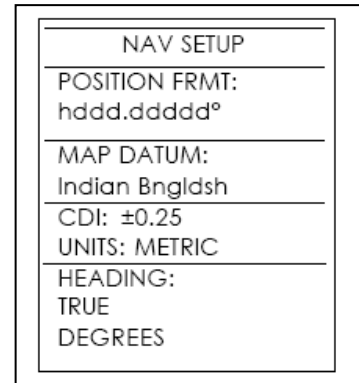
3.5. Navigating to the inventory plot using GARMIN handheld GPS

(Detailed manual is provided at Appendix 4.1)

*It should be ensured that the GPS is SET to Indian Bangladesh Datum and HDD format.
To do these proceed as follows*

3.5.1 Required SETUP of GARMIN 12 handheld GPS

- Switch on GPS
- Press PAGE button to reach the fifth screen with the Title MAIN MENU
- Use up and down arrow to reach SETUP MENU and Press ENTER
- Use up and down arrow to scroll to NAVIGATION and press ENTER
- The Screen should look as given here. Otherwise change the position format



3.5.1.2 To Change the position format and datum:

Press Page button till Main Menu appears > Setup Menu > Navigation > Position Format > Press Enter > Select the required format > Similarly Change the datum.

3.5.1.3 To store a position of the waypoint

Switch the ON the instrument > Wait till the position appears in the second screen > Press Mark Button > Change the label and symbol if required > Press Enter Button (DONE).

3.5.1.4 To create a way point

Goto Main Menu Page > Waypoint > New > Enter the position, number, label > Done.

3.5.1.5 To Navigate

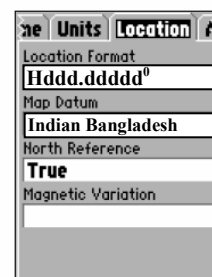
Press GOTO Button > Select Waypoint from the list > Press Enter Button > It Displays the Compass with Bearing and Distance.

3.5.2 Required SETUP of GARMIN 72 handheld GPS

3.5.2.1 To Change the position format and datum:

Press Page till Main Menu appears > Select Setup Menu > Select the Location Tab > Location Format > Press Enter > Select the required format using UP and DOWN arrows > Similarly Change the datum.

Main Menu
Location Tab



Setup Menu — 'Location' Tab

3.5.2.2 To store a position of the waypoint

Switch the ON the instrument > Wait till the position appears in the first screen > Press Mark Button > Change the label and symbol if required > Press Enter Button (DONE).

3.5.2.3 To create a way point

Press ENTER / MARK Button for 2 sec. > Mark Waypoint page will be displayed > Enter the position, Symbol, label > OK.

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To enter the desired latitude, longitude or to change the name of the location use UP and DOWN arrows

3.5.2.4 To Navigate

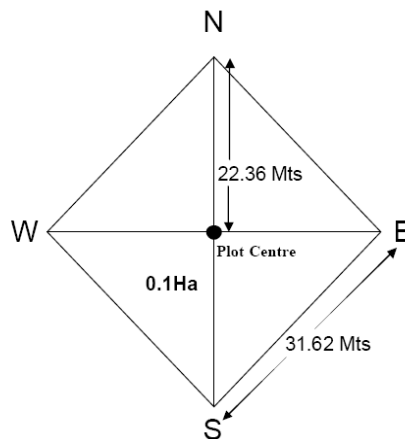
Press GOTO Button > Select Waypoint from the list > Press Enter Button > It Displays the Compass with Bearing and Distance.

In case the field team is not able to reach any point, it should lay the plot at the point where it has reached and inform the matter to the Division level test-checking officer on the same day itself. The Division level test-checking officer will then inform the Geomatics Centre through e-mail on the same day. Please remember that this concession has to be used very rarely and in case of genuine problems only.

3.6. Laying of Sample Plots and Methodology for enumeration

3.6.1 For Natural Forests

The size of the sample point will be 0.1 Ha and it will be laid as per the measurements shown in the diagram.



After fixing the plot centre, fix the N, S, E and W corners of the plot by measuring 22.36 m horizontal distance by tape/rope from center in all four directions. Stout pegs or bamboo of 1.5 m height should be fixed at each corner and a flag attached to it. Check the correctness of layout by measuring each side, which should be 31.62 m. If possible ranging rods also can be used as corner posts. A red/white colour cloth may be tied at the top end of these corner posts for getting clear visibility from different spots in the plot.

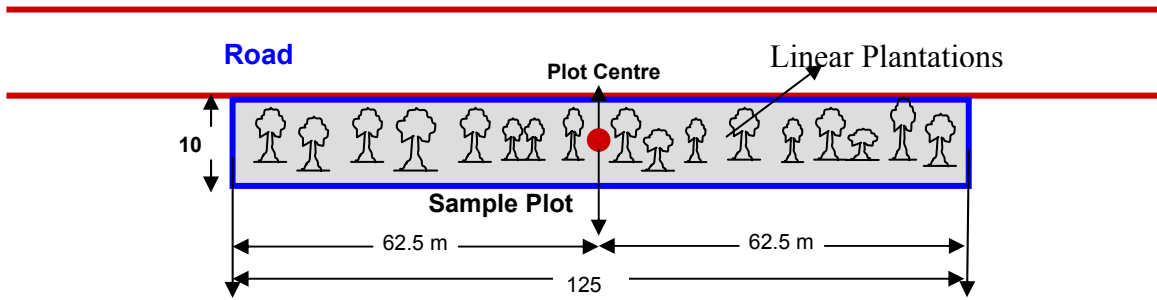
3.6.2 For Block Plantations

The size of the sample point will be 0.1 Ha and to be laid as described in 3.6.1 Natural forests.

3.6.3 For Linear Stratum

The size of the sample plot is **10m x 125m** and the number samples per district will be 60. After reaching the center of the plot at given longitude and latitude as per sample list, the plot centre is to be fixed keeping 62.5m on both sides. Accordingly, plot along the linear strip is to be laid out and width of 10m will be taken with the help of chain/ measuring tape from the starting canopy of the strip of trees. If any of the side is less than 62.5 m then plot center is to be adjusted in such a manner that each side of the adjusted plot is 62.5 m respectively, as shown in the figure below. The actual longitude

and latitude of the mid point of the length (adjusted plot center) of laid out sample plot may be recorded in the TOF Form 1 & 2 at appropriate place.

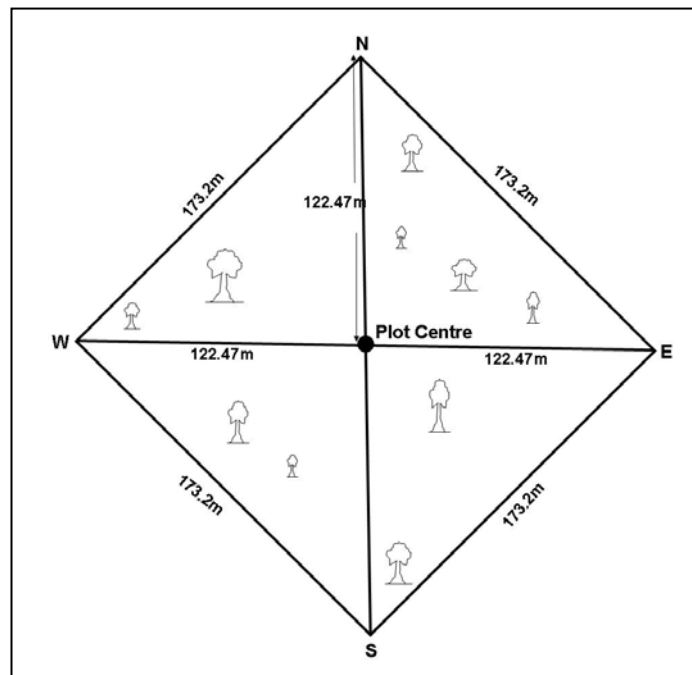


3.6.4 For Scattered trees:

In a district 60 square plots of 3.0 ha size will be located & enumerated. After reaching plot center at given longitude & latitude a square plot of 3.0 ha will be laid out.

The lay out of the plot shall be carried out using any method mentioned below

a) After fixing the plot centre, fix the NE, SE, SW, NW corners of the plot by measuring 122.47 m horizontal distance from the plot center, by Steel tape in all four directions. These four corners should be marked by thin poles or bamboos of 5 cm dia and 1.5 m height. If possible ranging rods can also be used as corner posts. A red/white color cloth may be tied at the top end of these corner posts for getting clear visibility from different spots in the plot. In case, the 3.0 ha square plot includes part of block or/and linear stratum then plot center should be adjusted suitably to exclude undesired stratum.



b) Another method of laying out of sample plot is using GPS alone. Along with the lat-long of centre point, the other four corners lat-longs will be provided in the map supplied by the Geomatics Centre.

Check the dimensions of the plot i.e. all sides should measure 173.20 meters horizontal distance.

3.6.5 For Urban habitation:

The urban areas will be delineated in to five classes based on the geographical area calculated from the satellite imagery. Each urban habitation will be subdivided into various blocks based on the roads and natural features; and these blocks will be randomly selected for carrying out the enumeration. Total enumeration will be done in each block.

3.6.6 For Rural habitation:

The rural areas will be delineated in to five classes based on the geographical area of the village calculated from the satellite imagery. In a District 6-10 sample locations in each class shall be considered for total enumeration.

After laying out the plot, the enumeration work will be started. Enumeration will commence from Northwest corner of the plot and will proceed in clockwise direction. The information will be recorded in Plot Approach/Description and Plot Enumeration forms.

3.7 Data Collection

While the plot is being laid and data is being collected the Crew leader should complete the plot approach form and plot description form. The following precautions should be observed while collecting data.

1. The forms should be filled in good legible writing.
2. The code numbers should be correctly and neatly recorded.
3. Overwriting should be avoided. If an entry is found to be wrong, it should be cut and correct entry made.
4. If complete data of a plot cannot be accommodated in one sheet, a second sheet of the same form may be used clearly marking Page 1/2, 2/2 etc.

On completion of the work in a plot, the crew leader should scrutinize the forms if any information is missing or doubtful. All equipment should be collected. The crew should then proceed to the next plot and repeat the work. After completing all plots the crew shall return back to the camping site. Once in the camp the crew leader should again scrutinize the forms to ensure that no information is missing before sending it to the Designated Officer for Forest Inventory.

3.8. TOF – Field Forms

3.8.1 Form No 1: Plot Approach/Description Form

This form gives details, such as mode of travel up to the reference point and conspicuous features observed during the journey. This form will also indicate the starting time from camp and arrival at the reference point, time of arrival at the plot(s), time of leaving the plot(s) and time of returning to camp. The Crew Leader must fill up the proper identification of the plot by reading correct codes from the manual against each item. Descriptive information is to be given in the space provided for the item. Extra sheets may be used (wherever the given space is not sufficient) with proper identification on the sheet. The different work done by the individual members of Crew should also be indicated against the items in the Plot Approach/Description Form. While filling this form the Crew Leaders should keep in mind that all information in this form is recorded in such a manner that it will help in relocating the plot during cross-checking.

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Col. No	Field	Description																				
1	Plot No.	This will be the code number/serial number given in the table in the plot map																				
2	Date	DD MM YYYY																				
3	Name of the Camping Place	Place of previous night halt																				
4	Time (hr) at which left the Camp	This will be 24 hr time format e.g. 6 AM will be 06.00 and 4.30 PM will be 16.30 (in IST)																				
5	Distance covered by vehicle (km)																					
6	Time taken in journey by vehicle	This will be 24 hr time format																				
7	Time at which started on foot	This will be 24 hr time format																				
8	Time of arrival at the Plot	This will be 24 hr time format																				
9	Plot Center: Longitude (DD)	This will be the actual Longitude as recorded by the field team at the plot center.																				
10	Plot Center: Latitude (DD)	This will be the actual Latitude as recorded by the field team at the plot center.																				
11	Plot destination mark	Name of village is to be recorded where the plot falls																				
12	Stratum Code	<table border="1"> <thead> <tr> <th><u>Code</u></th> <th><u>Stratum</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Natural Forests</td> </tr> <tr> <td>2</td> <td>Block Plantations</td> </tr> <tr> <td>3</td> <td>Linear Plantations</td> </tr> <tr> <td>4</td> <td>Urban habitations (delineated based on area)</td> </tr> <tr> <td>5</td> <td>Rural habitation (delineated based on area)</td> </tr> <tr> <td>6</td> <td>Mapping of individual trees</td> </tr> </tbody> </table>	<u>Code</u>	<u>Stratum</u>	1	Natural Forests	2	Block Plantations	3	Linear Plantations	4	Urban habitations (delineated based on area)	5	Rural habitation (delineated based on area)	6	Mapping of individual trees						
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3	Other Government Department																					
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14	District Code (2 digit code)	<table border="1"> <thead> <tr> <th><u>District</u></th> <th><u>Code</u></th> <th><u>District</u></th> <th><u>Code</u></th> </tr> </thead> <tbody> <tr> <td>Adilabad</td> <td>01</td> <td>Medak</td> <td>13</td> </tr> <tr> <td>Ananthapur</td> <td>02</td> <td>Nalgonda</td> <td>14</td> </tr> <tr> <td>Chittoor</td> <td>03</td> <td>Nellore</td> <td>15</td> </tr> <tr> <td>East godavari</td> <td>04</td> <td>Nizamabad</td> <td>16</td> </tr> </tbody> </table>	<u>District</u>	<u>Code</u>	<u>District</u>	<u>Code</u>	Adilabad	01	Medak	13	Ananthapur	02	Nalgonda	14	Chittoor	03	Nellore	15	East godavari	04	Nizamabad	16
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		Guntur	05	Prakasham	17	
		Hyderabad	06	Ranga reddy	18	
		Kadapa	07	Srikakulam	19	
		Karim nagar	08	Vishakhapatnam	20	
		Khammam	09	Vizianagaram	21	
		Krishna	10	Warangal	22	
		Kurnool	11	West godavari	23	
		Mahabubnagar	12			
15	Division Name	from the field				
16	Range Name	from the field				
17	Beat Name	from the field				
18	Time of departure from the Plot	This will be 24 hr time				
19	Time at which returned to camp	This will be 24 hr time				
20	Navigation done by	Name of Person along with equipment used				
21	Plot lay out by	Self explanatory				
22	Enumeration done by	Self explanatory				
23	Remarks	Self explanatory				

3.8.2 Form–2: Plot Enumeration Form

In this form data of trees (diameter and Height of trees) and bamboo clumps will be recorded. **Trees below 10 cm Diameter at breast height over bark (dbhob) and dead trees of having utility less than 70% are not to be enumerated.**

Plot Enumeration form for each plot will be maintained separately. If a plot contains a large number of trees/bamboo clumps wherein all the data cannot be accommodated in one single form sheet, then additional form sheets in continuation may be used and in that case the total of all trees/bamboo clumps in the plot will be given in each page. Trees, the stems of which touch the North and West border lines of the plot (called border-line trees) will be enumerated. However, trees the stems of which touch the East and South border lines of the plot will be treated as ‘out trees’ and will not be enumerated. ‘In’ and ‘out’ bamboo would be similarly decided and treated. Enumeration of trees/bamboo will commence from the NW quadrant of the plot, serially numbered and will proceed in clockwise direction. The tree numbers can be written by paint or marker pen without scraping the bark. In the North Eastern (NE) quadrant, diameter and height of the trees shall be measured. In the remaining part of the plot only DBH shall be measured.

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The coding instructions for filling up of the plot enumeration form are as under:

Col. No.	Field	Description																
1	Plot No.	This will be the code number/serial number given in table of plot map																
2	Plot Center: Longitude (DD)	This will be the actual Longitude as recorded by the field team at the plot center.																
3	Plot Center: Latitude (DD)	This will be the actual Latitude as recorded by the field team at the plot center.																
4	Stratum Code	<table border="1"> <thead> <tr> <th>Code</th> <th>Stratum</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Natural Forests</td> </tr> <tr> <td>2</td> <td>Block Plantations</td> </tr> <tr> <td>3</td> <td>Linear Plantations</td> </tr> <tr> <td>4</td> <td>Urban habitations (delineated based on area)</td> </tr> <tr> <td>5</td> <td>Rural habitation (delineated based on area)</td> </tr> <tr> <td>6</td> <td>Mapping of individual trees</td> </tr> </tbody> </table>	Code	Stratum	1	Natural Forests	2	Block Plantations	3	Linear Plantations	4	Urban habitations (delineated based on area)	5	Rural habitation (delineated based on area)	6	Mapping of individual trees		
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5	Plot ownership	<table border="1"> <thead> <tr> <th>Code</th> <th>Stratum</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Private individual</td> </tr> <tr> <td>2</td> <td>Forest Department</td> </tr> <tr> <td>3</td> <td>Other Government Department</td> </tr> <tr> <td>4</td> <td>Panchayat Land</td> </tr> <tr> <td>5</td> <td>Institutions (Govt.)</td> </tr> <tr> <td>6</td> <td>Private others</td> </tr> <tr> <td>7</td> <td>Others (specify)</td> </tr> </tbody> </table>	Code	Stratum	1	Private individual	2	Forest Department	3	Other Government Department	4	Panchayat Land	5	Institutions (Govt.)	6	Private others	7	Others (specify)
Code	Stratum																	
1	Private individual																	
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3	Other Government Department																	
4	Panchayat Land																	
5	Institutions (Govt.)																	
6	Private others																	
7	Others (specify)																	
6	Basal Area	In case of natural forests, block & linear plantations. To be measured with wedge prism																
7	Year of raising plantation	In case of block and linear plantations																
8	Espacement (m)	In case of block and linear plantations																
9	Tree No	Give serial number																
10	Species Code	Four digit Code will be given as in Annex. II																
11	Species Name	Local or Botanical name of the species will be written in this column.																
12	DBH (cm)	The diameter in cm at breast height over bark will be filled in three digits.																
13	Height of the tree (m)	In case of natural forests, block & linear plantations. Measured using the RAVI altimeter in NE quadrant of the Plot only.																
14	No. of culms	In case of bamboo species, number of culms in that clump will be recorded. Enumeration form used for regular inventory will be used.																

The diameter of all the trees falling in the plot will be measured at a height of 1.37 meters from ground level (i.e. at breast height) and will be recorded to the nearest centimeter. The axis of the calipers (i.e. the long arm of the calipers) will always be kept pointed to the

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centre of the plot while taking diameter measurement of trees. If there is flare at the breast height of a tree, in that case, the diameter measurement would be taken immediately above or below the flare whichever is nearer to breast height. In case of buttressed and large sized trees diameter may be measured by tape or taking girth and converting it to diameter by multiplying with $7/22$ or 0.318 factor. In case there is forking of a tree below its breast height, diameter of each forked stem (provided diameter of each forked stem > 10 cm) will be measured at breast height (above forking) and recorded separately, as if for two trees. Dead trees, if not rotten and provided 70% of their wood is utilizable, will also be enumerated. The diameter of a bamboo clump will be measured at its base with the help of a tape by placing the tape. (see appendix II for detailed procedure for dia measurement)

3.9. Field Work to be carried out per Day

Each crew shall complete inventory of 3 plots on an average in one working day for natural forests, block plantations and linear stratum. Presuming the availability of minimum 20 working days in a month the monthly output should be above 60 plots per crew. Considering availability of 9 months of fair weather season in a year the annual inventory work by a crew should be at least $60 \times 9 = 540$ plots. The above limits are the lower limits of work considering all conditions etc. However, efforts should be made to improve the output of work. In case of scattered trees completion of 1 sample plot per day must be ensured.

Chapter IV - Appendices

4.1 Appendix 1: Global Positioning System (GPS)

GPS Stands for Global Positioning System. GPS system is developed by DOD (Department of Defense) of USA. It consists of 28 Satellites covering the globe in six orbital planes. Each plane has a 4-6 satellites. These GPS Satellites are revolving the earth at an altitude of 20,200 km to provide complete coverage. GPS signals are free, available round the clock, anywhere on the globe and in all season. Line of sight is not necessary and there is no need to measure distances. Minimum four satellites must be tracked to get the X, Y, Z coordinates (latitude, longitude, altitude) and three Satellites for X, Y coordinates (latitude, longitude). Each plane has a 4-6 satellites GPS is a complex system which can be used to achieve positional accuracies ranging from 10 m to ppm (parts per million) depending on the equipment and method used. Navigation, surveying and integration with Geographic Information Systems (GIS) are just a few of the fields which have seen the successful application of GPS Technology. Use **GARMIN GPS 12/72 Handheld** GPS for navigation and recording purposes. The crews will be trained in this equipment. *Please do not use any other Make or model to avoid confusion.*

Procedure for use of GARMIN 12 Handheld GPS

The GARMIN GPS Hand Held Instrument consists of following Buttons:

GOTO:	Used for navigation
RED LIGHT:	This is ON/OFF Button
QUIT:	Goes back one screen
PAGE:	Goes one screen front (It contains 5 screens)
MARK:	To save the location
ENTER:	To save the coordinates information
FOUR ARROWS:	Cursor movement
DISPLAY SCREEN:	Displays the page wise information

Press and hold **red light** button for 2 seconds to switch on/off the instrument. This Instrument contains Five Screens / Pages.

- First Screen gives the information about Satellites.
- Second Screen gives the information about Position of the Local features.
- Third Screen gives the information about Maps.
- Fourth Screen displays the Compass.
- Fifth Screen gives the information about the Main Menu.

First Screen

This screen gives the Number of Satellites Tracked i.e., Number of Satellites and their Position on hemisphere, North Direction, Status of Battery Charge.

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Second Screen

This screen gives the Time, Position i.e., Northing and Easting (Latitudes and Longitudes), Altitude i.e., Height above the Mean Sea Level in Meters, Trip, Speed i.e., km/hour, Track, True North Bearing (Position information from true north).

Third Screen

It contains the information about the Map, Zooming Scale, Panning, Options.

Fourth Screen

Compass displays the direction of the compass, Distance, Bearing, Track, Speed, and ETA.

Fifth Screen

It contains the information about the Main Menu, which has following items

Waypoint	an intermediate point - to create, rename, delete way points
Waypoint list	lists the waypoints stored in the instrument
Nearest Wpts	lists the waypoints that are more nearest
Proximity Wpts	lists waypoints at a specified distance
Routes	stores waypoints in the form of a route
Dist and Sun	distance and bearing between two waypoints
Messages	to broadcast messages
Setup Menu	to connect to computer, to change display formats, to set alarm etc

Menu Item Waypoint: an intermediate point in the survey

It displays the information about the position of the feature on the surface of the earth, such as Northing and Easting position, Label of the position, Date and Time of the information acquisition, Reference etc.

Dst:	Distance in KM
Rename:	To give a name to the Way point
New:	Creating the new way point
Delete:	Deleting the current Way point
Done:	Registering the information in the memory

Operations:

To Change the position format and datum:

Press Page button till Main Menu appears > Setup Menu > Navigation > Position Format > Press Enter > Select the required format > Similarly Change the datum.

To store a position of the waypoint

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Switch the ON the instrument > Wait till the position appears in the second screen > Press Mark Button > Change the label and symbol if required > Press Enter Button (DONE).

To create a way point

Goto Main Menu Page > Waypoint > New > Enter the position, number, label > Done.

To Navigate

Press GOTO Button > Select Waypoint from the list > Press Enter Button > It Displays the Compass with Bearing and Distance.

Procedure for use of GARMIN 72 Handheld GPS

The GARMIN GPS 72 Hand Held Instrument consists of following Buttons:

GOTO:	Used for navigation
RED LIGHT:	This is ON/OFF Button
QUIT:	Goes back one screen
PAGE:	Goes one screen front
MARK:	To save the location
ENTER:	To save the coordinates information
FOUR ARROWS:	Cursor movement
DISPLAY SCREEN:	Displays the page wise information
Zoom In	To zoom in the map
Zoom out	To Zoom out the map

Press and hold **red light** button for 2 seconds to switch on/off the instrument.

First Screen: - This is called as GPS information page.

This screen gives the Number of Satellites Tracked i.e., Number of Satellites and their Position on hemisphere, North Direction, Status of Battery Charge.

This screen gives the Time, Position i.e., Northing and Easting (Latitudes and Longitudes), Altitude i.e., Height above the Mean Sea Level in Meters, Trip, Speed i.e., km/hour, Track, True North Bearing (Position information from true north).

Second Screen: - This page is called as Map page.

It contains the information about the Map, Zooming Scale, Panning, Options.

Third Screen:- This page is called as Compass page or Pointer page.

Compass displays the direction of the compass, Distance, Bearing, Track, Speed, and ETA.

Fourth Screen:- High way page

Fifth Screen contains the information about the Main Menu. Press two times the Menu button then Main Menu page Trip computer page appears. There we find units, time, position format etc. By moving curser we set the time zone (+5.30), units (as Meters), location format (DDs) and map Datum (WGS84).

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Operations:

To Change the Location format and datum:

Press Page till Main Menu appears > Select Setup Menu > Select the Location Tab > Location Format > Press Enter > Select the required format using UP and DOWN arrows > Similarly Change the datum.

To store a position of the waypoint:

Switch the ON the instrument by pressing the red button on the instrument > Wait the till the position appears in the FIRST screen > Press ENTER / MARK Button for 2 sec.> Change the Name and symbol if required > Press Enter Button.

To create a way point:

Press ENTER / MARK Button for 2 sec > Mark Waypoint page will be displayed > Enter the position, Symbol, label > OK. To enter the desired latitude, longitude or to change the name of the location use UP and DOWN arrows.

To Navigate:

Press GO TO Button > Select Waypoint from the list > Press Enter Button > It Displays the Compass with Bearing and Distance.

To conduct survey in track mode: Area Calculation

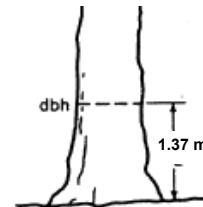
Go to Main menu page > press 'Tracks' > press menu> track setup menu will be displayed > select options 'WRAP when full/ Stop when full/off', set the record interval > displays the total extent of the area traversed.

(Before going start the survey select Option 'WRAP when full/ stop when full'—after traversing the whole area i.e. after completion of survey select OFF option)

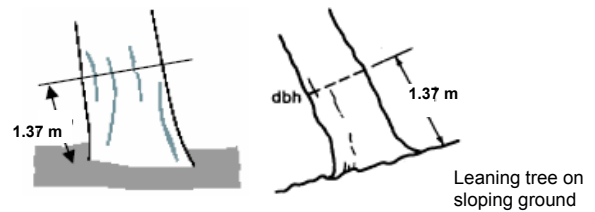
4.2 Appendix 2: Measurement of Tree Diameter

In forest inventory work, tree diameter has been traditionally measured at 1.37 meters above the ground or root of the crown if the root crown is exposed, a point defined as diameter at breast height (DBH). The exact position of DBH is also dependent of individual tree form and topography. For measurement of diameter calipers or tapes are used. The following situations may be encountered in measurement of tree diameter.

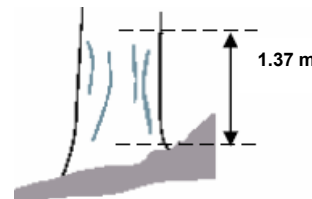
Diameter on flat ground: Measure DBH at 1.37 m above the ground.



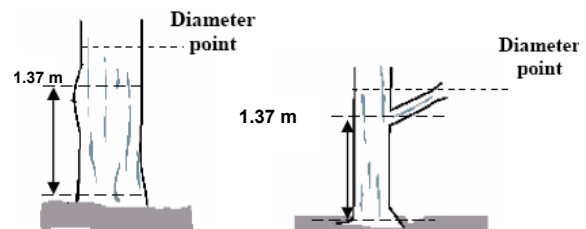
Leaning tree: Measure diameter at 1.37 m from the ground along the bole.



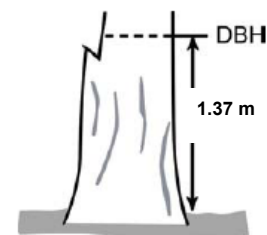
Tree on slope: Measure diameter at 1.37 m from the ground along the bole on the uphill side of the tree.



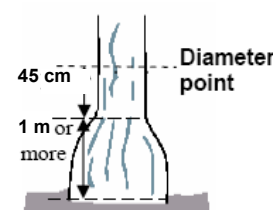
Tree with irregularities at DBH: On trees with swellings, bumps, depressions, and branches at DBH, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form.



Missing wood or bark. Do not reconstruct the DBH of a tree that is missing wood or bark or at the point of measurement. Record the Diameter of the wood and bark that is still attached to the tree.



Tree with butt-swell or bottleneck: Measure these trees 45 cm above the end of the swell or bottleneck if the swell or bottleneck extends 1.0 m or more above the ground.

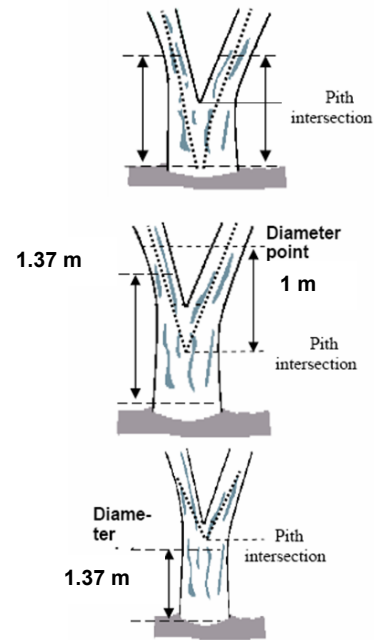


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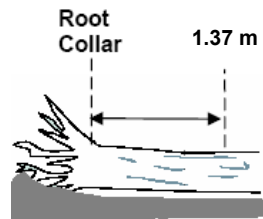
Forked tree:

Trees forked below 1.37 m. Trees forked in this region are treated as distinctly separate trees. Distances and azimuths are measured individually to the center of each stem where it splits from the stump. DBH is measured for each stem at 1.37 m above the ground.

Trees forked at or above 1.37 m. Trees forked in this region count as one single tree. If a fork occurs at or immediately above 1.37 m, measure diameter below the fork just beneath any swelling that would inflate DBH.



Live wind thrown tree: Measure from the top of the root collar along the length to 4.5 feet.



4.3 Appendix 3: Measurement of Tree Height

Height measurements are collected for every tree of each species encountered in the **North-Eastern quadrant of the whole plot**. For each “height” tree, measure total height, or the distance from the top of the crown to the ground. For this purpose *Ravi altimeter* will be used. The *Ravi altimeter* has five scales – two for the heights graduated to distances, one for the degrees, one for the slope correction and one for the slope percent.

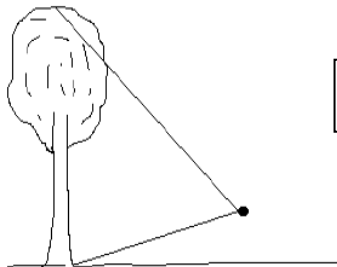
Tree height determination requires altimeter readings of both tree top and base levels. The values will be added if they have the opposite sign and subtracted from one another if they have the same sign.

The use and operation of Ravi altimeter is as follows

- Measure 20/30 m distance from the base of the tree in a direction such that top and bottom are visible.
- Hold the instrument firmly in one hand, support with other hand and sight the top/bottom of the tree through eye (the instrument holding side) with other eye closed.
- After the top/bottom is sighted, close sighting eye, open other eye and observe the needle to stabilize. Click the locking pin gradually without shaking the instrument.
- See the appropriate scale in the altimeter and note down the reading.

The following cases may be encountered while measuring tree height.

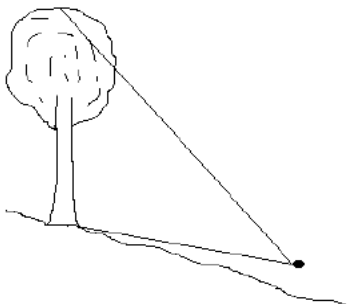
Case I - On a Flat ground: Record the top height and add the height of the eye level.



Total Height = Top Height + Height of the eye level.

Case II - On a Sloping Ground: Height of the tree top and bottom has to be recorded.

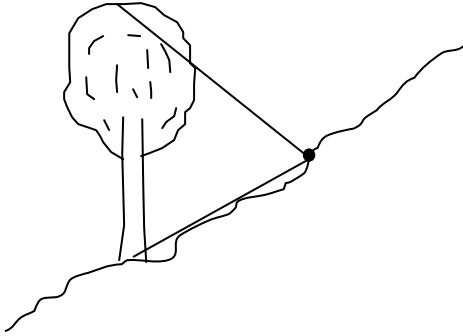
- **Case II a:** If the observer is on the downhill side and below the base of the tree, the base value is subtracted from the top value.



Total Height = Top Height – Bottom Height.

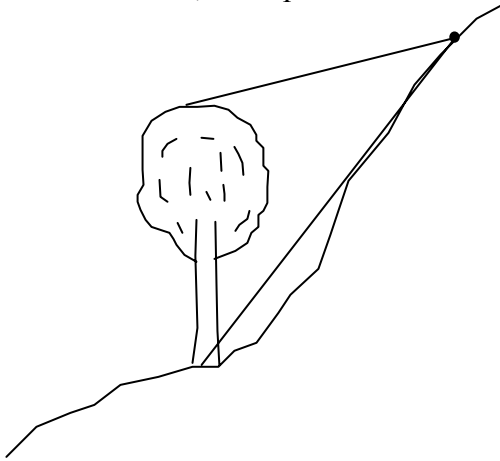
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- **Case II b:** If the observer is on the uphill side and above the base of the tree, the base value is added to the top value.



Total Height = Top Height + Bottom Height.

- **Case II c:** If the observer is on the uphill side and above the base and top of the tree, the top value is subtracted from the base value.



Total Height = Bottom Height - Top Height.

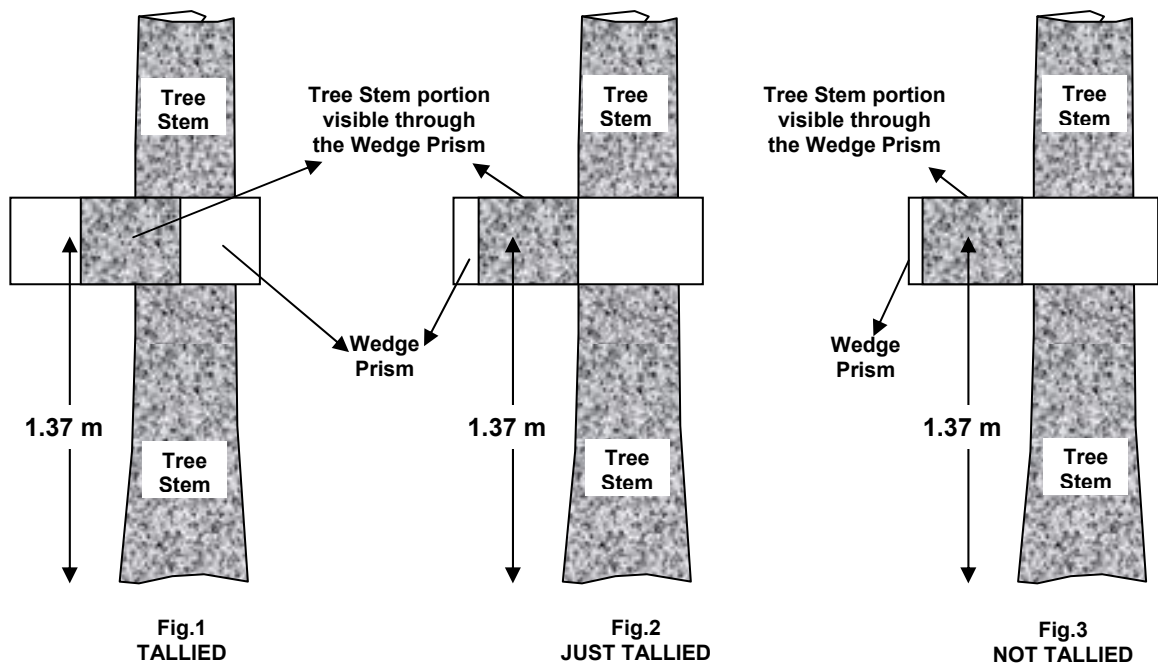
4.4 Appendix 4: Measurement of Basal Area using wedge prism

Basal Area is a way of explaining the crowdedness or density of a stand. The basal area of a tree can be thought of as the surface area of the top of the stump if the tree was cut at 1.37 meters above the ground. The total surface area of all the stump tops in a hectare is the basal area per hectare. Basal area measurements are expressed in square meters per hectare. A wedge prism is used to measure basal area. Each wedge prism has a particular Basal Area Factor (BAF), like 0.5, 1, 2.0, 5, 10 square meters per hectare.

The use and operation of a wedge prism is very easy and is given below

- Place a 1.37 m tall stick at the plot center and place the wedge prism on it. In case the plot center has a stone carrion then place this stick as close to the carrion as possible.
- Look through the prism and observe the tree stem at breast height through it. Rotate the prism and move yourself in a complete circle while looking through it.
- The line of sight should be at right angles to the prism.
- You can begin with a tree in the northern direction or any other prominent tree.
- Observe the displacement of the stem portion seen through the Wedge Prism.
- If the displacement of the tree, as seen through the prism, is such that the displaced portion is within the limits of the tree stem, as shown in Fig.1, the tree is said to be '*TALLIED*' and it is counted.
- If the displacement coincides with the tree's edge, as shown in Fig.2, it is borderline tree (*JUST TALLIED*).
- If the displacement of the tree, as seen through the prism, is beyond that part of the tree not seen through the prism, as shown in Fig.3, the tree is '*NOT TALLIED*' and it is not counted.
- While counting, maintain the 1.37 m tall stick perpendicular to the ground; rotate the wedge prism on this stick itself and you should also move in a circle around this stick. *Do not move the stick from its place while making observation.*
- As you continue around your circle to the direction that you began, you total how many trees are counted.
- Total number of IN trees = Total number of TALLIED trees + $\frac{1}{2}$ (Total number of JUST TALLIED trees)
- Basal area = Total number of IN trees X Basal Area Factor

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Correction for slope: The correction for the slope is applied, if the slope is more than 18 degrees.

- In sloping areas try to maintain the stick perpendicular to the ground, with the help of altimeter provided to you.
- Follow the procedure of calculating the basal area as in case of level ground
- With the help of altimeter, observe the slope in degrees.
- Multiply the basal area obtained with the multiplication factor using the Table given below.

Angle of Slope	Multiplication factor
20	1.064
25	1.103
30	1.155
35	1.221
40	1.305
45	1.414

Angle of Slope	Multiplication factor
50	1.558
55	1.743
60	2
65	2.366
70	2.924
75	3.864

4.5 Appendix 5: Tree species names and Codes

Code	Scientific Name	Local Name
1	Acacia auriculaeformis	Acacia auriculaeformis
2	Acacia caesia	Yerra cheeki
3	Acacia chundra	Sandra
4	Acacia farnesiana	Acacia farnesiana
5	Acacia ferruginea	An-sandra
6	Acacia latronum	Budajala
7	Acacia leucophloea	Tella tumma
8	Acacia nilotica	Nala tuma
9	Acacia planifrons	Godugu thumma
10	Acacia sinnata	Sikayi
11	Acacia suma	Tellachandra
12	Acalypha ciliata	Kukka Yegi
13	Acasia latronam	burrajala
14	Acorus Calamus	Vasakoya
15	Actinodaphene maderaspatana	Yenda Chettu
16	Adina cordifolia	Bandaru
17	Aegiceras comiculatum	Guggilam (Mangrove)
18	Aegiceras corniculata	Dudumera
19	Aegle marmelos	Maredu
20	Aerva scandens	Pidi,Pindi kura
21	Aglaia elaeagnoides	Yerra Adugu
22	Agnosma dicotoma	Mala, Naga musti
23	Ailanthus excelsa	Ailanthus excelsa
24	Akabguyn svifolium	Othuku
25	Alangium salvifolium	Uduga
26	Albizia amara	Albizia amara
27	Albizia lebbek	Dirsanam
28	Albizia odoratissima	Chinduga
29	Albizia procera	Albizia procera
30	Albizia stipulata	Albizia stipulata
31	Alphonsea lutea	Muvva / Muvvi
32	Alphonsea sclerocarpa	Pulusu Mamidi
33	Alstonia scholaris	Eddakla Pala
34	Anacardium occidentale	Jidi Mamidi
35	Anisochilus earnosus	Adusupundlaaku
36	Annona squamosa	seethaphal
37	Anogeissus latifolia	Velama/ Yalama
38	Anogeisus acuminata	Pasi
39	Anogeisus latifolia	Tiruman
40	Anthocephalus kadamba	Kadamba
41	Antidesma bunius	Janu Polari
42	Antidesma diaesemblika	pulleru
43	Antidesma ghaesembilla	Giridi chettu
44	Antidesma menasu	Nakkaagadamu
45	Aphanostachys polystachya	Aphanostachys polystachya
46	Arbus preicatorius	Gorivi
47	Arisomelus malabarica	Maga Beera

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48	<i>Artocarpus heterophyllus</i>	Panasa
49	<i>Artocarpus hirsutus</i>	<i>Artocarpus hirsutus</i>
50	<i>Artocarpus lakoocha</i>	Kammaregu
51	<i>Atlantia monophylla</i>	Karu Nimma
52	<i>Atylosia lineata</i>	Chinnangi
53	<i>Avicenia maxima</i>	Tella Mada
54	<i>Avicenia officinalis</i>	Nalla Mada
55	<i>Azadirachta indica</i>	Yepa
56	<i>Balanites aegyptiaca</i>	Gara
57	<i>Ballospermum montanum</i>	Nelajeedi
58	<i>Barringtonia acutangula</i>	Kadimi
59	<i>Bauhinia malabarica</i>	<i>Bauhinia malabarica</i>
60	<i>Bauhinia purpurea</i>	<i>Bauhinia purpurea</i>
61	<i>Bauhinia racemosa</i>	<i>Bauhinia racemosa</i>
62	<i>Bauhinia retusa</i>	<i>Bauhinia retusa</i>
63	<i>Bauhinia variegata</i>	<i>Bauhinia variegata</i>
64	<i>Beilschmedia roxburghiana</i>	<i>Beilschmedia roxburghiana</i>
65	<i>Bischofia javanica</i>	Panta
66	<i>Blastania garcinii</i>	Gudalaala
67	<i>Boethavia chinensis</i>	Kanumasri
68	<i>Bombax ceiba</i>	Buruga
69	<i>Bombax religiosum</i>	Adavi buruga
70	<i>Borassus flabellifer</i>	<i>Borassus flabellifer</i>
71	<i>Borassus flabelliformis</i>	Adavi Thati
72	<i>Boswellia glabra</i>	Anduga
73	<i>Boswellia ovalifoliata</i>	<i>Boswellia ovalifoliata</i>
74	<i>Boswellia serrata</i>	Gandru-chettu
75	<i>Breynia vitis-idaea</i>	sitapalamu,bahuniyam,pandi barralu
76	<i>Bridelia cinerascous</i>	Korra maddi
77	<i>Bridelia hamiltoniana</i>	Ponchothakam
78	<i>Bridella Montana</i>	Panchogi / Panchavoni
79	<i>Bridellia retusa</i>	Nara madi
80	<i>Broussonetia papyrifera</i>	<i>Broussonetia papyrifera</i>
81	<i>Bruguiera cylindrica</i>	Vurada
82	<i>Bruguiera gymnorrhiza</i>	Kandiga
83	<i>Buchanania axillaris</i>	pandi porla chettu,
84	<i>Buchanania lanceolata</i>	Pandri kudula
85	<i>Buchanania latifolia</i>	Sara
86	<i>Buchanania Lanzana</i>	Sarapappu
87	<i>Buchnanan laanania</i>	Morli, Mori
88	<i>Buddleia asiatica</i>	<i>Buddleia asiatica</i>
89	<i>Bursera serrata</i>	Yerra karra
90	<i>Butea monospema</i>	Moduga Chettu
91	<i>Butea Frondosa</i>	Palasa
92	<i>Butea superba</i>	Teega moduga
93	<i>Callicarpa arborea</i>	<i>Callicarpa arborea</i>
94	<i>Calophyllum ionophyllum</i>	Pona
95	<i>Calopropis gigantea</i>	Jilledu (Adavi),Pala jilledi
96	<i>Calotyopis procera</i>	Buggajilledu
97	<i>Calycopteris floribunda</i>	Adavi Jama
98	<i>Canthium dicoccum</i>	Nella Balusu
99	<i>Canthium parviflorum</i>	Gara

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100	<i>Capparis grandis</i>	Reguti
101	<i>Capparis divicata</i>	Burtod
102	<i>Carallia brachiata</i>	Kaarali
103	<i>Cardia obliqua</i>	Saara papu
104	<i>Careya arborea</i>	Budadharimi
105	<i>Carissa carandas</i>	Kalivi
106	<i>Carratia trifolia</i>	Pulimeri (Pulimada)
107	<i>Caryota urens</i>	Caryota urens
108	<i>Casearia elliptica</i>	Kannebisire
109	<i>Casearia esculenta</i>	Gidugu
110	<i>Casia astoria</i>	korandam
111	<i>Cassia fistula</i>	Rela
112	<i>Cassia siamea</i>	Seema tangedu
113	<i>Cassine glauca</i>	Neridi
114	<i>Casuarina equisetifolia</i>	Sarugudu
115	<i>Catularegum spinosa</i>	Manga
116	<i>Ceiba pentandra</i>	Mulla Buruga
117	<i>Celastrus paniculata</i>	Kasuru / Kassara
118	<i>Celosia argentea</i>	Gunugu
119	<i>Celtis australis</i>	Celtis australis
120	<i>Celtis cinnamomea</i>	Koti-Bira
121	<i>Celtis tetrandra</i>	Jabjabal
122	<i>Ceriops decandra</i>	Gatharu
123	<i>Chloroxylon swietenia</i>	Chloroxylon swietenia
124	<i>Choclospermum gossipium</i>	Konda Buruga
125	<i>Chomelia asiatica</i>	Kommi
126	<i>Chukrasia tabularis</i>	Konda Vepa
127	<i>Cinnamomum zeylanicum</i>	Dalchini chekka
128	<i>Cipadessa baccifera</i>	Chedumanu
129	<i>Cissus vitiginea</i>	Teega gummudu
130	<i>Citrus limon</i>	Dabba
131	<i>Citrus Pseudolimon</i>	Naradabba
132	<i>Cleistanthus collinus</i>	Kodisha
133	<i>Cleome gynandra</i>	Vamu / Vaminta
134	<i>Clerodendron phlomidis</i>	Nelli
135	<i>Clerodendrum inceme</i>	Pitchi putcha/Erru pucha
136	<i>Clitoria ternatea</i>	Sankumanu
137	<i>Cluytia collina</i>	Odisa
138	<i>Cocculus hirsutus</i>	Dusara teega
139	<i>Cochlo sperhun</i>	gomu
140	<i>Cochlospermum religiosum</i>	Konda Gogu
141	<i>Coghlopermum pelaipim</i>	Chinna balusu
142	<i>Colycopteris floribunda</i>	Bontha
143	<i>Combretum ovalifolium</i>	Potani,Putangi
144	<i>Commelina benghalensis</i>	Vennamaddi
145	<i>Commiphora berryi</i>	Commiphora berryi
146	<i>Commiphora caudata</i>	Kondamamidi
147	<i>Corchorus aestuans</i>	Kalasi
148	<i>Cordia dichotoma</i>	Banka manu
149	<i>Cordia macleodii</i>	Pedda botuku
150	<i>Cordia myxa</i>	Iriki
151	<i>Cordia walichii</i>	Cordia walichii

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152	<i>Costhi speciasus</i>	kistayeti
153	<i>Cratesia religiosa</i>	Usikamani
154	<i>Cronton bonplandianus</i>	Kukka mirapa
155	<i>Croton Oblogifolium</i>	Buthankush
156	<i>Crotonseabiosus</i>	Kondachilla / Verri chilla
157	<i>Cucumis trigobus</i>	Gummadu, Kodumanu
158	<i>Cucurbita maxima</i>	Gummadi tekku
159	<i>Curcuma pseudomontana</i>	Pasupu manu
160	<i>Cycas sphaericus</i>	<i>Cycas sphaericus</i>
161	<i>Cycas beddomei</i>	<i>Cycas beddomei</i>
162	<i>cycas carinalis</i>	Rangabulli
163	<i>Dalbergia lanceolata</i>	Patsari
164	<i>Dalbergia latifolia</i>	Jitregi
165	<i>Dalbergia paniculata</i>	Pachari
166	<i>Dalbergia sissoo</i>	Sissoo
167	<i>Delonix regia</i>	Gul Mohar
168	<i>Dendro Calamas Strictus</i>	Bamboo
169	<i>Dendrophthoe falcata</i>	Jarri
170	<i>Desmodium gangeticum</i>	Kolamuku
171	<i>Desmodium hetrcarpus</i>	Adavichinta
172	<i>Desmodium oojainensis</i>	<i>Desmodium oojainensis</i>
173	<i>Dichrostachys cinera</i>	Velthuru
174	<i>Dillenia bracteata</i>	Kalli Teak
175	<i>Dillenia indica</i>	Peda Kalinga
176	<i>Dillenia pentagyna</i>	Revadi Chettu
177	<i>Dioscorea tomentosa</i>	Teegadhari, Theega dumpa
178	<i>Diospyros melodubia</i>	Tuki
179	<i>Diospyros candolleana</i>	<i>Diospyros candolleana</i>
180	<i>Diospyros chloroxylon</i>	Ullintha
181	<i>Diospyros cordifolia</i>	<i>Diospyros cordifolia</i>
182	<i>Diospyros ebum</i>	Nalla utti
183	<i>Diospyros melanoxylon</i>	Tuniki
184	<i>Diospyros montana</i>	Erra gatha
185	<i>Diospyros ovalifolia</i>	Kuka tuniki
186	<i>Diospyros peregrina</i>	Racha tuniki
187	<i>Diospyros sylvatica</i>	Tella gatha
188	<i>Diospyros tomentosa</i>	Peethi palaki, Kommi
189	<i>Dodonaea viscosa</i>	Pulivavili, Puli vavili
190	<i>Dolichandrone crispa</i>	Niruddi
191	<i>Dolichandrone falcata</i>	Oddi
192	<i>Dolichos Uniflorum</i>	Valuvalu
193	<i>Drris indica</i>	Ganugu
194	<i>Drypetes sepiaria</i>	Bira
195	<i>Eeretia acuminata var. serrata</i>	<i>Eeretia acuminata var. serrata</i>
196	<i>Ehretia aspera</i>	bappadam
197	<i>Ehretia laevis</i>	Tella pisini
198	<i>Ehretia microphylla</i>	Gomu chettu
199	<i>Elaeobendron roxburgu</i>	Butancus
200	<i>Elaeocarpus lucidus</i>	<i>Elaeocarpus lucidus</i>
201	<i>Eluodendrum monogynum</i>	Nerendra
202	<i>Ephorbia prostrata</i>	Aku kalli
203	<i>Eragistielia bifarice</i>	Nuli

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204	<i>Erianthus arundinaceus</i>	Ponuga
205	<i>Erioglossum rubiginosum</i>	Ishirashi
206	<i>Eriolaena hookeriana</i>	Nara Botka
207	<i>Erythoina ludica</i>	Bardoni
208	<i>Erythoxylum monogynum</i>	Devadharu
209	<i>Erythrina variegata</i>	Baridapu
210	<i>Erythrina indica</i>	Badida
211	<i>Erythrina suberosa</i>	Muni-Modugu
212	<i>Eucalyptus camaldulensis</i>	Eucalyptus camaldulensis
213	<i>Eucalyptus tereticornis</i>	Eucalyptus tereticornis
214	<i>Eugenia caryophyllifolia</i>	Kaki chettu
215	<i>Euphorbia antiquorum</i>	Bontha jemudu
216	<i>Euphorbia nivulia</i>	Pedda ullinda, Chinna Ullinda
217	<i>Euphorbia tirucalli</i>	Kalli
218	<i>Exoecaria agallocha</i>	Tella
219	<i>Feronia limonia</i>	Velega
220	<i>Ferronia Elephantam</i>	Telka
221	<i>Ficuilas tsiela</i>	Ficuilas tsiela
222	<i>Ficus arnottiana</i>	Kalla ravi
223	<i>Ficus benghalensis</i>	Mari
224	<i>Ficus benjamina</i>	Konda golugu
225	<i>Ficus carica</i>	Anjara
226	<i>Ficus heterophylla</i>	Kuvu juvi
227	<i>Ficus hispida</i>	Bommudu
228	<i>Ficus infectoria</i>	Konda Mukkara
229	<i>Ficus krishnae</i>	Ficus krishnae
230	<i>Ficus lucesens</i>	BendaJuvvi
231	<i>Ficus microcarpa</i>	Konda Pillara
232	<i>Ficus mollis</i>	Ficus mollis
233	<i>Ficus mysorensis</i>	Goni Chettu
234	<i>Ficus racemosa</i>	Medi
235	<i>Ficus religiosa</i>	Ravi
236	<i>Ficus Tinctoria</i>	Kappa
237	<i>Fievs mollis</i>	Jivvi / Juvvi
238	<i>Firmiania colorata</i>	Kharka
239	<i>Flacourtia indica</i>	Mulla elaka
240	<i>Flacoutia ramontchi</i>	yerravaludu
241	<i>Flemigia macrophylla</i>	Andibhi
242	<i>Fluggea leucopyrus</i>	Pulugone
243	<i>Garcinia spicata</i>	Pidatha
244	<i>Garcinia xanthocymus</i>	Iwara Mamidi
245	<i>Gardenia florida</i>	Pedda Bikki
246	<i>Gardenia fragrans</i>	Peddamanga
247	<i>Gardenia gumnifura</i>	Chitamata
248	<i>Gardenia latifolia</i>	chit mit
249	<i>Gardenia lucida</i>	Kukka velega
250	<i>Gardenia resinifera</i>	Kondamanga
251	<i>Gardinia turgida</i>	Tella aluka
252	<i>Garuga pinnata</i>	Garugudu
253	<i>Girardinia heterophylla</i>	Gadda Neela
254	<i>Givotia mollucana</i>	Eldigamanu
255	<i>Givotia rottleriformis</i>	Konda Ponaku

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256	<i>Gliricidia maculata</i>	<i>Gliricidia maculata</i>
257	<i>Glochidion zeylanicum</i>	Pageri
258	<i>Glochidium velutina</i>	<i>Glochidium velutina</i>
259	<i>Glycosmis arborea</i>	gamu
260	<i>Glycosmis pentaphylla</i>	Gonji
261	<i>Gmelina arborea</i>	<i>Gmelina arborea</i>
262	<i>Golonium laccolatum</i>	Velidebba
263	<i>Grevillea robusta</i>	<i>Grevillea robusta</i>
264	<i>Grewelia hirsuta</i>	Bontha chettu
265	<i>Grewia aspera</i>	Guvvanka
266	<i>Grewia bicolor</i>	Muvvanchi
267	<i>Grewia damina</i>	Adavi Jaama, Anapa
268	<i>Grewia flavescens</i>	Metaka
269	<i>Grewia hirsuta</i>	Jibilika
270	<i>Grewia obtusifolia</i>	Padata Yepi
271	<i>Grewia rothi</i>	Jama
272	<i>Grewia rotundifolia</i>	Jana
273	<i>Grewia tiliifolia</i>	Tada
274	<i>Guazuma ulmifolia</i>	Bhadraksha
275	<i>Guettarda speciosa</i>	Pedda ulimidi
276	<i>Gymnemasylvested</i>	puttapatara
277	<i>Gymnosporia spinosa</i>	Danti
278	<i>Gymnostoreacmertanata</i>	Dharami
279	<i>Gyrocarpus americanus</i>	Tella poniki
280	<i>Hardwickia pinnata</i>	Nara Yepi
281	<i>Hedychium coronarium</i>	Dumpani
282	<i>Helecteres isora</i>	Thada
283	<i>Hemidesmus indicus</i>	Gudipala
284	<i>Heterophragam quadriloculare</i>	Kala-Goru
285	<i>Heyna trijuga</i>	Gore gudda
286	<i>Hibiscus tiliaceus</i>	<i>Hibiscus tiliaceus</i>
287	<i>Hibiscus vitifollus</i>	Pedda benda
288	<i>Hibisum Pentanifolia</i>	Kondagogu
289	<i>Hildegardia populifolia</i>	<i>Hildegardia populifolia</i>
290	<i>Hiptage madablota</i>	Adavi putnangi
291	<i>Holarrhena antidysenterica</i>	Pala kodisha
292	<i>Holarrhena pubescens/antidysenterica</i>	Palachettu
293	<i>Holaryna pubesus</i>	Estharipala
294	<i>Holoptelia integrefolia</i>	Nemilinara
295	<i>Holorina Antidecentrica</i>	Gudipala
296	<i>Homalium nepalense</i>	<i>Homalium nepalense</i>
297	<i>Hydnocarpus alpina</i>	Yeru Tunki
298	<i>Hymenodictyon</i>	Chedippa
299	<i>Hymenodictyon orixense</i>	<i>Hymenodictyon orixense</i>
300	<i>Hymenvictryn exceisum</i>	Buriya
301	<i>Iconocarpus frutescenes</i>	No name
302	<i>Impatiens balsamina</i>	Kasi / Kasitumma
303	<i>Indigofera palchella</i>	Sirla
304	<i>Ipomoeapes tigridis</i>	Mekadawada
305	<i>Isocandra candolleana</i>	Kondayippa
306	<i>Ixora arborea</i>	Koya

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307	<i>Ixora parviflora</i>	Korangi
308	<i>Ixora pavetta</i>	Korivi
309	<i>Jatropha gasifolium</i>	Nelpula / Nepala
310	<i>Jatropha curcas</i>	kodayinam
311	<i>Jatropha glandulifera</i>	Adavi Amudam
312	<i>Jatropha gossypifolia</i>	Sema nepali
313	<i>Kigellia africana</i>	Yeugala
314	<i>Kydia calycina</i>	Konda-Podari
315	<i>Lagerstroemia parvifolia</i>	Chenangi
316	<i>Lannea coromandelica</i>	Gumpena
317	<i>Lantana chemera</i>	Lantana chemera
318	<i>Lepisanthes tetraphylla</i>	<i>Lepisanthes tetraphylla</i>
319	<i>Leucaena leucocephala</i>	Subabul
320	<i>Limonia acidissima</i>	Elaka
321	<i>Limonia alata</i>	Konda Nimma
322	<i>Limonia crenulata</i>	<i>Limonia crenulata</i>
323	<i>Limonia elephantum</i>	Velaga Chinta, Velaga
324	<i>Linociera malabarica</i>	Punna gannu
325	<i>Linociera ramiflora</i>	Satapala
326	<i>Linociera zeylanica</i>	Nellidabba
327	<i>Litsea decanensis</i>	Nara mamidi
328	<i>Litsea glutinosa</i> Nara-chettu	<i>Litsea glutinosa</i> Nara-chettu
329	<i>Litsea monopetala</i>	Meda
330	<i>Luffa acutangula</i>	Adavi Beera
331	<i>Lumintzera racemosa</i>	Thanduga
332	<i>Maba buxifolia</i>	Uti
333	<i>Macaranga peltata</i>	Boddi
334	<i>Madhuca indica</i>	Ippa
335	<i>Madhuca longifolia</i>	<i>Madhuca longifolia</i>
336	<i>Mallotus philippensis</i>	Sundari
337	<i>Mangifera indica</i>	Mamidi
338	<i>Mangifera Sylvatica</i>	Adavi mamidi
339	<i>Manilkara hexandra</i>	Pala
340	<i>Manisurus mtyusus</i>	Nalla ponugu
341	<i>Maytenus emarginata</i>	Donthi
342	<i>Melia azedarach</i>	Turka vepa
343	<i>Meliosma pinnata</i>	<i>Meliosma pinnata</i>
344	<i>Memocylon umbellatum</i>	Alli, Nalli alli
345	<i>Merremia emerginata</i>	Yelika chevulu, Yelika chevulu teega
346	<i>Mesua ferrea</i>	Naga Keshara
347	<i>Michelia champaka</i>	Champakamu
348	<i>Mikusa tomentosa</i>	Gadida Lotta
349	<i>Milium tomentosa</i>	Barre Dudduga
350	<i>Milium Velutina</i>	Rachilaka
351	<i>Millingtonia hortensis</i>	Akasa malli
352	<i>Mimusops elengi</i>	Pogada
353	<i>Mitragyna parviflora</i>	Bataganapu
354	<i>Mitrayoua pavifolia</i>	Borraganapa
355	<i>Mollugo disticha</i>	Peddapalimota
356	<i>Monigga oleifera</i>	Karumunaga
357	<i>Morinda cleftifolia</i>	Maddi
358	<i>Morinda tinctoria</i>	Togara mogali

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359	<i>Morinda tomentosa</i>	Bandapaki
360	<i>Moringa concanensis</i>	Adavi munaga
361	<i>Mucuna pruriens</i>	Dhoolmaddi / Dhooldhondi
362	<i>Mundulea sericea</i>	Verri billu
363	<i>Munulea Suberosa</i>	Nela Murri
364	<i>Murayya paniculata</i>	Ganchi cheppu
365	<i>Mutingia calabura</i>	Kukka Magi
366	<i>Mysistila firagrans / Woodfordia furticosa</i>	Jagi
367	<i>Naringi crenulata</i>	Torri velaga, Munukudu
368	<i>Nauclea orientalis</i>	<i>Nauclea orientalis</i>
369	<i>Neolitsea foliolosa</i>	Buroyida
370	<i>Nyctanthes arbortrists</i>	Kithapu
371	<i>Ochna jabotapita</i>	Janika / Tammi
372	<i>Ochna obtusata</i>	Sonnari
373	<i>Ochna squarrosa</i>	Tammi, Sunari
374	<i>Ocimum sanctum</i>	Tulasi
375	<i>Oegenia dalbergiodes</i>	Anapa
376	<i>Olax scandens</i>	Elka thoka, Kurugodi
377	<i>Olea dioica</i>	<i>Olea dioica</i>
378	<i>Oroxylon indicum</i>	Dundilam
379	Others	Chicken kampa
380	Others	Chitapata
381	Others	Kailepa, Kalivepa
382	Others	Kandruka
383	Others	Rompi, Rompi theega
384	Others	Kallagedu
385	Others	Chinugu
386	Others	Omme
387	Others	Peddegi
388	Others	Soppera
389	Others	Bojja
390	Others	Pedda manu
391	Others	Bokka neredu
392	Others	Panchothkam
393	Others	Xylodebri formis
394	Others	Bottakadimi
395	Others	<i>Embllica officnalysis</i>
396	Others	Nallaveni
397	Others	Pesari ginne
398	Others	Budippa
399	Others	Tellamaddi
400	Others	Nallagidi
401	Others	Mendalsula chettu
402	Others	Ootika
403	Others	Pasili gunna
404	Others	Polallal
405	Others	Togarumunuga
406	Others	Gunguru
407	Others	Dumpidi
408	Others	Aare
409	Others	Gundumukkedu

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410	Others	Mabbu Nalla
411	Others	Tella pulicheru
412	Others	Penchuduchettu
413	Others	Gubba baravedu
414	Others	Unknown
415	Ougenia ojenencies	Daruga
416	Oxalis corniculata	Puliadugu
417	Pallaquium ellepticum	Pala
418	Pamburus missionis	Adavi nimma
419	Panera vahlii	Parutaku chettu
420	Parviflorum lamk	Balsoni
421	Pavetta candolleana	Peddamanga
422	Pavetta indica	Padava
423	Pavonia odorata	Pudumaddhi
424	Pedaliium murex	Chalidikokidi
425	Peltophorum pteocarpum	Peltophorum pteocarpum
426	Persea macrantha	Nara
427	Phobe paniculata	Phobe paniculata
428	Phoenix Loureirii	Adavi Eetha
429	Phoenix sylvestris	Phoenix sylvestris
430	Phragmites karka	Korivelaga / Eela karra
431	Phyia nodiflora	Bokkedumanu
432	Phyllanthus distichous	Racha usiri
433	Phyllanthus emblica	Usiri
434	Phyllanthus reticulatus	Pulcheru
435	Phyllanthus Virgatus	Gada usiri
436	Pithecellobium dulce	Seema chinta
437	Pittosporum floribundum	Pittosporum floribundum
438	Plectranthus fruticasus	Gaggera
439	Pleiospermum alatum	Muriki nimma
440	Pleurostyliia opposita	Pyari
441	Plumbago zeylanica	Chitramoola
442	Polyalthia cerassoides	Chilikaduddi
443	Polyalthia serasoides	Gotti
444	Polyalthia suberosa	Eti Dudugs
445	Polythia longifolia	Devadari
446	Pongamia pinnata	Kanuga
447	Premna latifolia	Takli
448	Premna tomentosa	Naguru
449	Prosopis juliferra	Karratumma
450	Prosopisspicigera	Jammi
451	Prothium serratum	Unduruku
452	Pterminelia tomentosa	nallamaddi
453	Pterocarpus marsupium	Yegisa
454	Pterocarpus santalinus	Yera chandanam
455	Pterospermum acerifolium	loliki
456	Pterospermum suberifolium	Narudu
457	Pterospermum xylocarpum	Lolugu
458	Putranjiva roxburghii	Yenki/Venki,Danthi
459	Radermachera xylocarpa	Naguru
460	Randia spinosa	Manga
461	Randia uliginosa	Duddu Manga/Adavi Manga

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462	Rhizophora apiculata	Kakki ponna
463	Rhizophora mucronata	Upoo-ponna
464	Ricinus communis	Amudamu
465	Sacco petalum tomentosa	Nalla manu, Danthi
466	Salix tetrasperma	Iroda
467	Salvadora persica	Chekkera-chettu
468	Samanea saman	Nidra Ganeru
469	Santalum album	Sandalwood
470	Sapindus emarginatus	Kunkudu
471	Sapium insigne	Garbhasula
472	Saraca asoka	Asokamu
473	Sarcostemma acidum	Aku jamudu
474	Schefflera roxburghii	Purugodi
475	Schleichera oleosa	Pusuku
476	Schrebera swietinioides	Mokkem
477	Scolopia crenulata	Scolopia crenulata
478	Scurrula cordifolia	Badanika, Dadara
479	Scutia myrtina	Garika
480	Scutina mystina	Korinda
481	Secuinega leucopyrus	Pulugodu
482	Semicarpus anacardium	Ndiala je
483	Sesbania grandiflora	Tellaa Suimint
484	Shorea falura	Thalari
485	Shorea robusta	Gugal
486	Shorea roxburghii	Jalari
487	Shorea tumbuggaia	Tamba
488	Sida rhombifolia	Guba cheppali/Guba tada
489	Sonneretia apetala	Kalinga
490	Sonnerretia caseolaris	Kandla
491	Sorghum halepense	chali kukudu, Adavi jonna
492	Soymida febrifuga	Somi
493	Spermadictyon suaveolens	Yerra Yogi, Mabbu kukudu
494	Spondias pinnata	Konda Mamidi
495	Spondios mangifera	Chali mamadi, Erra gorivi
496	Stenosiphonium russelianum	Ponteega
497	Sterculia foetida	Sterculia foetida
498	Sterculia urens	Tapasi
499	Sterculia villosa	Vakkunara
500	Sterospermum personatum	Isikarasi
501	Sterospermum suaveolens	Paatala
502	Sterospermum xylocarpum	Addaiku
503	Streblus asper	Barinka
504	Strychnos nux-vomica	Mushti
505	Strychnos patatorum	Chila
506	Sulvadora persica	Varagogu chettu / Polimeta
507	Suregada multiflorum	Surugata
508	Syzygium alternifolium	Jinna
509	Syzygium cuminii	Neredu
510	Syzygium jambos	Alla Neredu
511	Tabernaemontana divaricata	Govardnam / Nandivardanam
512	Tamarindus indica	Chinta
513	Tamarix dioica	Penpa

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514	<i>Tectona grandis</i>	Teku
515	<i>Terminalia alata</i>	Dudamaddi
516	<i>Terminalia paniculata</i>	Neemeeri
517	<i>Tephrosia purpurea</i>	Tella vempalli
518	<i>Terenna astatica</i>	Papidi
519	<i>Terminalia arjuna</i>	Arjuna
520	<i>Terminalia bellirica</i>	<i>Terminalia bellirica</i>
521	<i>Terminalia Catappa</i>	Adavibadam
522	<i>Terminalia chebula</i>	<i>Terminalia chebula</i>
523	<i>Terminalia pallida</i>	Tella karaka
524	<i>Terminalia tomentosa</i>	<i>Terminalia tomentosa</i>
525	<i>Tetrameles nudiflora</i>	<i>Tetrameles nudiflora</i>
526	<i>Thespesia populnea</i>	Ganga-ravi
527	<i>Toona ciliata</i>	Gli manu
528	<i>Trema orientalis</i>	Boggu chettu
529	<i>Trewia nudiflora</i>	Botku
530	<i>Tribulus terrestris</i>	Palleru
531	<i>Trichilia connaroides</i>	Gavada manu
532	<i>Tridax procumbens</i>	Bellam
533	<i>Vicoa indica</i>	Kukka Modi
534	<i>Vigna trilobata</i>	Konda pesara
535	<i>Viscum orbiculatum</i>	Pullurivi
536	<i>Vitex altissima</i>	Mayurapau
537	<i>Vitex leucoxydon</i>	Konda Vavili
538	<i>Vitex peduncularis</i>	<i>Vitex peduncularis</i>
539	<i>Vitex pinnata</i>	Nemali Adugu
540	<i>Vitex pubescens</i>	<i>Vitex pubescens</i>
541	<i>Vitex sp</i>	Jonna
542	<i>Walsura trifoliata</i>	Walsuri
543	<i>Webera corymbosa</i>	Nemmi
544	<i>Wendlandia corymbosa</i>	<i>Wendlandia corymbosa</i>
545	<i>Wrightia arobreia</i>	Tellakula
546	<i>Wrightia tinctoria</i>	Ankudu, Repala
547	<i>Wrightia tomentosa</i>	Tella Pala
548	<i>Xantolis tomentosa</i>	<i>Xantolis tomentosa</i>
549	<i>Ximenia americana</i>	Billidithilli
550	<i>Xylia xylocarpa</i>	Konda tangedu
551	<i>Zanthoxylum rhetsa</i>	Rhetsa-man
552	<i>Zanthoxylum armatum</i>	Kondakasima
553	<i>Zizyphus mauritiana</i>	Regu
554	<i>Zizyphus oenoplea</i>	Pariki
555	<i>Zizyphus xylopyrus</i>	Gotiki, gotti chettu, Danthi
556	<i>Zyzyphus nummu laria</i>	Kakireni
557	<i>Zyzyphus rugosa</i>	Dumpareni