R Functions for Tree Stem Cubature

About R4Mcubage

R4Mcubage (Version 0.5-5) is an R package designed to make easier and faster processing data from “tree rigourous cubature”. Tree rigorous cubature should be understood as the measuration of invividual tree stems and/or branches along their length, taking the stem/branch diameter outside bark and the stem/branch inside bark (optionally) at several fixed positions along the stem/branch length.

The package takes into account two types of crown shapes: excurrent and decurrent. For excurrent trees the basic unit for the measurement of the tree wood content (wood volume) is the stem, because branch wood content is considered negligible. For decurrent trees the branch is the basic unit for the measurement of the tree wood volume and it is assumed that one single stem might have multiples branches.

The packages has functions to perform the following operations: * computation of the total volume of stems; * interpolation of stem measures such as:

- diameter at a given height/position of the stem, and
- height/position at the stem for a given diameter.

* computation of merchantable volume as:

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   – merchantable volume up to a given merchantable diameter of the stem,
   – merchantable volume up to a given merchantable height at the stem,
   – merchantable volume for wood use classes defined as combinations of a
minimum log diameter and a log length.
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* computation of ratio of the merchantable volume to the total volume of the stem. * computation of form factor (empirical form factor) and form indices for the stem as a whole and for stem sections.

For decurrent trees data, some of the above computations can not be performed. The package also has some utility and plotting functions to help manage and analyse data from tree cubature.

About R4Mcubage

The **R** package **R4Mcubage** is a set of functions (**S3** language) to treat data from the measurement of the stem/branch sections of trees. It deals with excurrent and decurrent trees and can compute the tree wood containt in terms of following stem volume:

- total volume;
- merchantable volume for a given set of minimum merchantable stem diameters;
- merchantable volume for a given set of merchantable heights; and
- merchantable volume for a given set of combinantions of log diameter-length.

For excurrent trees, it also interpolates stem measurements (for individual stems) based on the relationship of diameter-height along the stem to generate:

- the stem diameter for a given height along the stem (absolute or relative to tree's total height); and
- the height along the stem for a given diameter (absolute or relative to tree's DBH).

R4Mcubage computes the merchantable volume ratio for:

- excurrent trees as the cumulative volume along the stem as function of diameter-height; and
- decurrent trees as the cumulative volume for the whole stem as a function of diameter.

Two functions for plotting make easy to plot:

- stem profile (excurrent trees) as absolute values of diameter-height or as taper equation data;
- branch profile (decurrent trees) as abolute values of diameter-height;
- merchantable volume ratio as function of diameter (excurrent/decurrent) or as function of height (excurrent only).

A interactive argument of the function for profile plotting allows the visual inspection of individual stems one-by-one for checking problematic data.

R4Mcubage's Objective

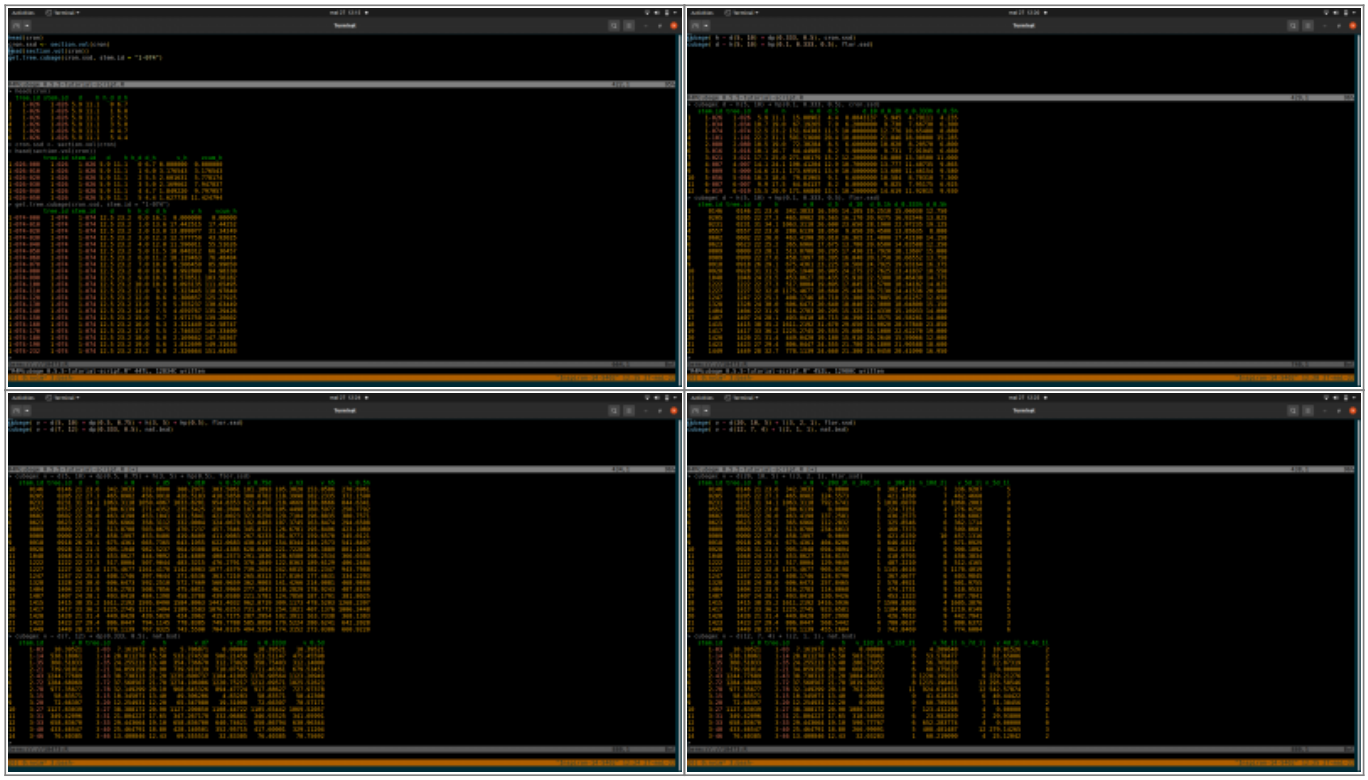
The objective of **R4Mcubage** is to make easy the computation of tree stem measurements in order to obtain data tables needed for the Forest Biometrics modelling of the trees. Particularly, the package's goal is to turn raw field measurements into proper data tables of

- any diameter and/or height along the stem;
- stem volume for given diameters and/or heights along the stem; and
- volume and number of logs for given combinations of log diameter-length.

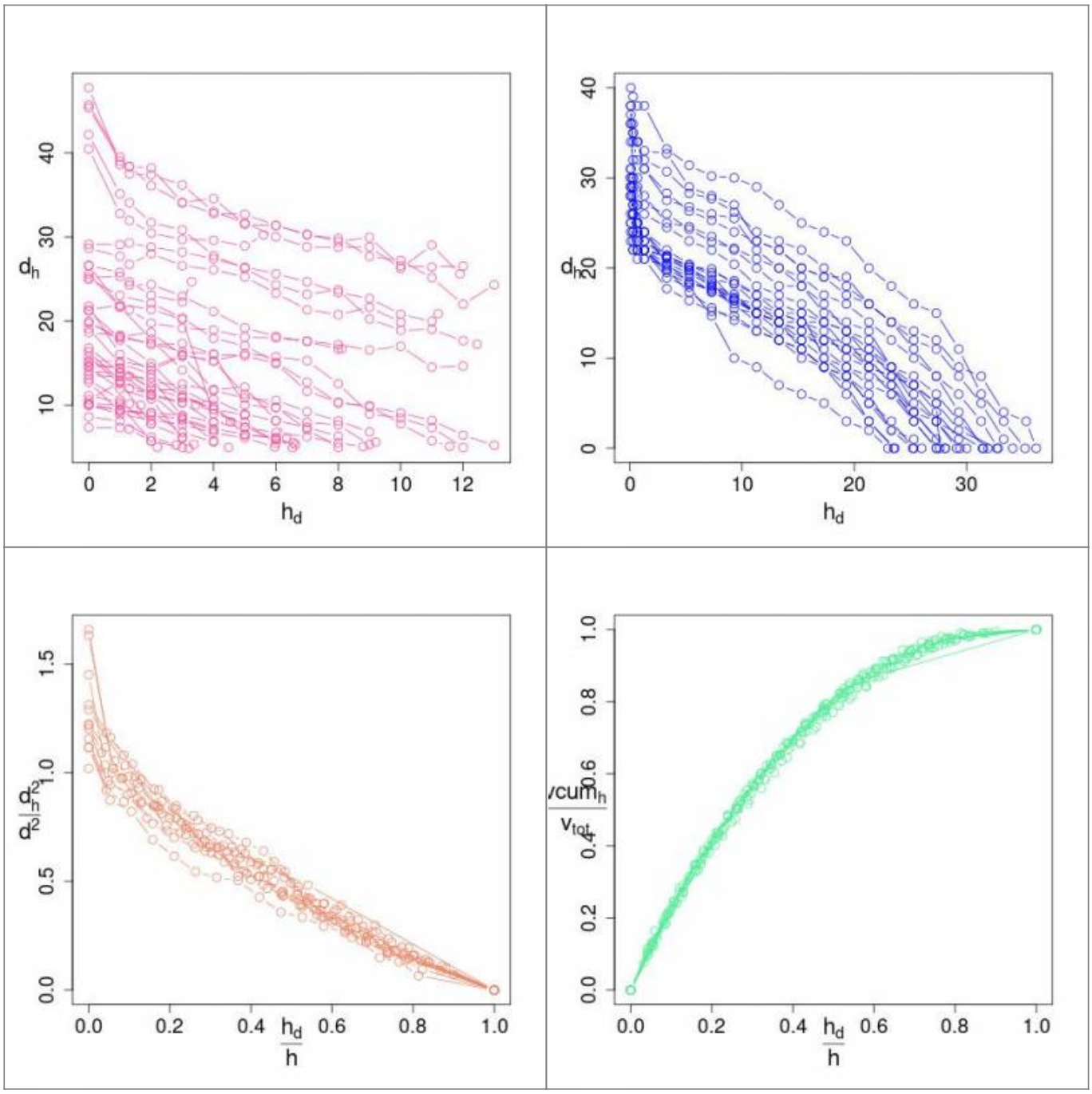
Which are the basic data needed for fitting models of:

- volume equations (total and merchantable);
- taper equations; and
- merchantable volume ratio index equations.

Screen Shots



Example Plots


d_h
h_d
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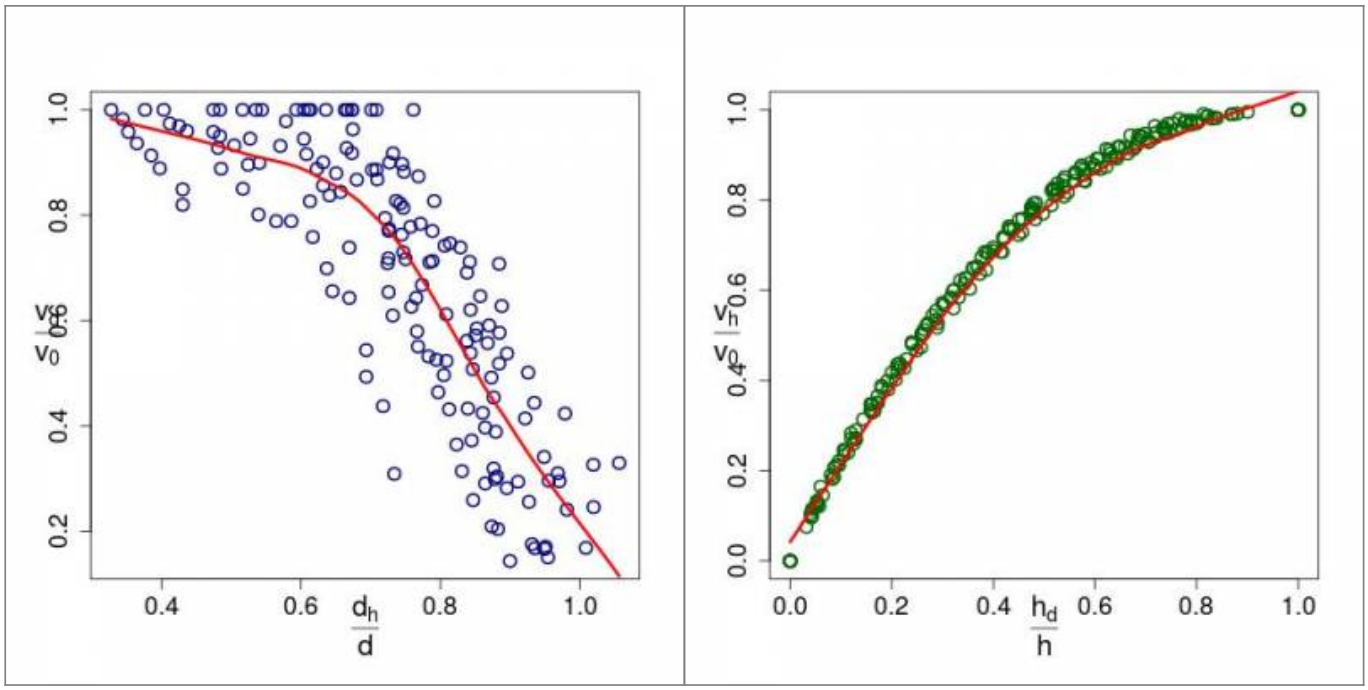
d_h²/d_h³
h_d/h
cum_h/v_tot
h_d/h



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- ***Pacote em desenvolvimento*** as a **.tar.gz** file.
- Tutorial PDF.

Contact

E-mail in *insilvaarbores.com.br*.