

# Package ‘THREC’

August 2, 2025

**Title** Tree Height Response Calibration for Swedish Forests

**Type** Package

**Version** 1.0.0

**Date** 2023-12-01

**Description** A tool that allows users to estimate tree height in the long-term forest experiments in Sweden. It utilizes the multilevel nonlinear mixed-effect height models developed for the forest experiments and consists of four functions for the main species, other conifer species, and other broadleaves. Each function within the system returns a data frame that includes the input data and the estimated heights for any missing values. Ogana et al. (2023) <[doi:10.1016/j.foreco.2023.120843](https://doi.org/10.1016/j.foreco.2023.120843)>\n Arias-Rodil et al. (2015) <[doi:10.1371/JOURNAL.PONE.0143521](https://doi.org/10.1371/JOURNAL.PONE.0143521)>.

**Encoding** UTF-8

**RoxygenNote** 7.2.3

**LazyData** TRUE

**Imports** Matrix, magic, Deriv (>= 1.0), dplyr (>= 1.0.0), tidyr (>= 1.1.0)

**Depends** R (>= 3.5.0)

**License** GPL (>= 3)

**NeedsCompilation** no

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**Repository** CRAN

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|       |                                                                  |
|-------|------------------------------------------------------------------|
| broad | <i>Tree data from the long-term forest experiments in Sweden</i> |
|-------|------------------------------------------------------------------|

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## Description

A subset of the data used for the development of multilevel mixed-effect height functions for the Swedish long-term forest experiments. For illustration purpose, the species code was changed. Report ...

## Usage

```
data(broad)
```

## Format

**broad:**

A data frame with 117 rows and 9 columns:

**yta** Plot number

**rev** Revision number

**t\_1** Species code

**hojd** Sampled tree height in meters

**dia** Diameter at breast height in centimeter

**hdom** Height of the tree with the largest diameter per plot regardless of the species

**ddom** Largest diameter per plot regardless of the species

**QMD** Quadratic mean diameter in centimeter per plot

**G** Basal area in meter square per hectare

## Source

[doi:10.1016/j.foreco.2023.120843](https://doi.org/10.1016/j.foreco.2023.120843)

## Examples

```
data(broad)
```

---

broadleaves*A response calibration function for the other broadleaves*

---

**Description**

This function performs a response calibration of the height function for other broadleaves. The other broadleaves include Black alder, Grey alder, Trembling aspen, Beech, Small-leaved lime, Rowan, Goat willow, Poplars, and other deciduous species. This function is not recommended for Oak species.

**Usage**

```
broadleaves(DATA)
```

**Arguments**

DATA                      data frame containing at least yta, rev, t\_l, dia, hdom, ddom, and hojd.

**Value**

data frame with estimated height

**Note**

yta: plot number, rev: revision, t\_l: species code, dia: diameter at breast height, hdom: height of the tree with the largest diameter (ddom) regardless of the species (m), hojd: sample tree height with missing values. In cases where hdom is not present in the inventory data, site index (SI) can serve as an alternative, although the estimated height may exhibit slight variations.

**Author(s)**

Ogana F.N. and Arias-Rodil M.

**References**

Ogana et al. (2023) <https://doi.org/10.1016/j.foreco.2023.120843>

Arias-Rodil et al. (2015) <https://doi.org/10.1371/JOURNAL.PONE.0143521>

**See Also**

[conifers\(\)](#), which estimate the tree height of other conifer species.

**Examples**

```
library(THREC)

# sample data
data(broad)

broadleaves(broad)
```

---

conifers

*A response calibration function for the other conifer species*


---

**Description**

This function performs a response calibration of the height function for other conifer species. The other conifer species include: Silver fir, Douglas fir, Sitka spruce, Siberian larch, European larch, other larch, Lodgepole pine, other fir, other spruces.

**Usage**

```
conifers(DATA)
```

**Arguments**

DATA                      data frame containing at least yta, rev, t\_l, dia, hdom, ddom, and hojd.

**Value**

data frame with estimated height

**Note**

yta: plot number, rev: revision, t\_l: species code, dia: diameter at breast height, hdom: height of the tree with the largest diameter (ddom) regardless of the species (m), hojd: sample tree height with missing values. In cases where hdom is not present in the inventory data, site index (SI) can serve as an alternative, although the estimated height may exhibit slight variations.

**Author(s)**

Ogana F.N. and Arias-Rodil M.

**References**

Ogana et al. (2023) <https://doi.org/10.1016/j.foreco.2023.120843>  
Arias-Rodil et al. (2015) <https://doi.org/10.1371/JOURNAL.PONE.0143521>

**See Also**

[broadleaves\(\)](#), which estimate the tree height of 'other broadleaves'.

**Examples**

```
library(THREC)

# sample data
data(broad)

conifers(broad)
```

---

main\_species

---

*Main species generalized function response calibration*


---

**Description**

This function performs a response calibration for main species at once. The main species include Scots pine, Norway spruce, and birch.

**Usage**

```
main_species(DATA)
```

**Arguments**

DATA                      data frame containing at least yta, rev, t\_l, dia, QMD, G, hdom, and hojd.

**Value**

data frame with estimated height

**Note**

yta: plot number, rev: revision, t\_l: species code, dia: diameter at breast height, QMD: quadratic mean diameter, G: basal area per ha, hdom: height of the tree with the largest diameter (ddom) regardless of the species (m), hojd: sample tree height with missing values. In cases where hdom is not present in the inventory data, site index (SI) can serve as an alternative, although the estimated height may exhibit slight variations.

**Author(s)**

Ogana F.N. and Arias-Rodil M.

**References**

Ogana et al. (2023) <https://doi.org/10.1016/j.foreco.2023.120843>  
Arias-Rodil et al. (2015) <https://doi.org/10.1371/JOURNAL.PONE.0143521>

**See Also**

[species\\_specific\(\)](#), which estimate the tree height of the main species based on species-specific height functions.

**Examples**

```
library(THREC)

# sample data
data(Treeht)

main_species(Treeht)
```

---

|                  |                                                                                       |
|------------------|---------------------------------------------------------------------------------------|
| species_specific | <i>Species-specific response calibration for Scots pine, Norway spruce, and Birch</i> |
|------------------|---------------------------------------------------------------------------------------|

---

**Description**

This function uses the plot- and revision-level random effects to predict missing tree height of Scots pine, Norway spruce and birch. It contains the species-specific height functions.

**Usage**

```
species_specific(DATA)
```

**Arguments**

DATA                      data frame containing at least yta, rev, t\_l, dia, QMD, G, hdom, hojd.

**Value**

data frame with estimated height

**Note**

yta: plot number, rev: revision, t\_l: species code (1: Scot pine; 2: Norway spruce; 3: Silver birch; 4: Downy birch), dia: diameter at breast height, QMD: quadratic mean diameter, G: basal area per ha, hdom: height of the tree with the largest diameter (ddom) regardless of the species (m), hojd: sample tree height with missing values. In cases where hdom is not present in the inventory data, site index (SI) can serve as an alternative, although the estimated height may exhibit slight variations.

**Author(s)**

Ogana F.N. and Arias-Rodil M.

**References**

Ogana et al. (2023) <https://doi.org/10.1016/j.foreco.2023.120843>  
 Arias-Rodil et al. (2015) <https://doi.org/10.1371/JOURNAL.PONE.0143521>

**See Also**

`main_species()`, which estimate the tree height of the main species based on equation 16 i.e., generalized function with species as a covariate (dummy variable).

**Examples**

```
library(THREC)

# sample data
data(Treeht)

species_specific(Treeht)
```

---

Treeht

---

*Tree data from the long-term forest experiments in Sweden*


---

**Description**

A subset of the data used for the development of multilevel mixed-effect height functions for the Swedish long-term forest experiments Report ...

**Usage**

```
data(Treeht)
```

**Format**

Treeht:

A data frame with 334 rows and 9 columns:

**yta** Plot number

**rev** Revision number

**t\_1** Species code

**hojd** Sampled tree height in meters

**dia** Diameter at breast height in centimeter

**hdom** Height of the tree with the largest diameter per plot regardless of the species

**ddom** Largest diameter per plot regardless of the species

**QMD** Quadratic mean diameter in centimeter per plot

**G** Basal area in meter square per hectare

**Source**

[doi:10.1016/j.foreco.2023.120843](https://doi.org/10.1016/j.foreco.2023.120843)

**Examples**

```
data(Treeht)
```

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