Package: LAD (via r-universe)

September 4, 2024

Type Package

Title Derive Leaf Angle Distribution (LAD) from Measured Leaf Inclination Angles

Version 0.1.0

Maintainer Francesco Chianucci <fchianucci@gmail.com>

Description Calculate mean statistics and leaf angle distribution type from measured leaf inclination angles. LAD distribution is fitted using a two-parameters (mu, nu) Beta distribution and compared with six theoretical LAD distributions. Additional information is provided in Chianucci and Cesaretti (2022) <doi:10.1101/2022.10.28.513998>.

License MIT + file LICENSE

Encoding UTF-8

LazyData true

RoxygenNote 7.2.2

Imports cowplot, dplyr, ggplot2, magrittr, purrr, rlang, stats, tidyr, tidyselect, utils

Depends R (>= 2.10)

NeedsCompilation no

Author Francesco Chianucci [aut, cre] (<https://orcid.org/0000-0002-5688-2060>), Lorenzo Cesaretti [aut]

Date/Publication 2023-06-11 11:30:04 UTC

Repository https://fchianucci.r-universe.dev

RemoteUrl https://github.com/cran/LAD

RemoteRef HEAD

RemoteSha e11b924b7a5205b23e46a596e06f6f1a8675177b

Contents

`calcLAD` *Calculate summary statistics from measured leaf inclination angles*

Description

The function derives summary statistics from measured leaf inclination angles:.

- Mean (MTA), standard deviation (SD) and frequency (NR) observations.
- The two (mu, nu) Beta parameters derived from the formula provided by Goel and Strebel (1984) doi:10.2134/agronj1984.00021962007600050021x.
- The distribution type, comparing the distribution against the six theoretical LAD distributions provided by de Wit (1965).

Arguments

`data`	Dataframe. The dataframe containing leaf inclination angle measurements.
`angles`	Numeric. The column containing leaf inclination angle measurements (in degrees).
`type`	Character. If set to "summary", it gives summary distributions. If set to "extended", it calculates LAD probability density (pdf) and G-function (G) for view or inclination angles (theta). Default set to "summary".
`...`	The column(s) indicating the grouping variables to be considered for calculating summary statistics.

Value

A dataframe with the grouping variable(s), and:

- summary statistics (MTA, SD, N, mu, nu, distribution) in case of type="summary";
- LAD (pdf) and G-function (G) in case of type="extended".

Examples

```
head(Chianucci)

calcLAD(Chianucci,Angle_degree,type='summary',Genus,Species)
calcLAD(Chianucci,Angle_degree,type='extended',Genus,Species)
```

`Chianucci` *Chianucci dataset*

Description

The dataset provide measured leaf inclination angles from 138 temperate and boreal woody species.

Usage

```
Chianucci
```

Format

`Chianucci`**:**

A data frame with 23,882 rows and 9 columns:

N row ID record

ICP_Code ICP species code, when available

Family, Genus, Species Family, Genus, Species taxonomy information

Author_citation Species author name

Canopy_sector The portion of the canopy where the leaves have been measured

Angle_degree Measured leaf inclination angles (degree)

Date Date of sampling (dd-mm-yy) ...

Source

doi:10.1007/s13595-018-0730-x

`fitLAD` *Fit Leaf Angle Distribution (LAD) from two-parameters (mu, nu) Beta distribution*

Description

The function derives both the Leaf Angle Distribution (LAD) and the G-function from two-parameters (mu, nu) Beta distribution.

- The LAD function is fitted through a Beta distribution as recommended by Goel and Strebel (1984).
- The G-function is derived from LAD using the formula provided by Ross (1981) and reported as Equations 2-3 by Chianucci et al. (2018).
- The fitted LAD is also compared with six theoretical LAD distributions provided by de Wit (1965).
- The distribution type is then classified using a leaf inclination index Ross (1975) and reported as Equation 8 by Chianucci et al. (2018).

Arguments

mu	Numeric. The mu parameter of the Beta distribution.
nu	Numeric. The nu parameter of the Beta distribution.
plot	Logical. If set to TRUE, it plots the measured and theoretical LAD and G distributions. Default set to FALSE.

Value

A list of two elements:

- dataset: a dataframe with three columns indicating the measured LAD (pdf), the G-function (G), for view or inclination angle (theta).
- distribution: a vector containing the matched distribution type.

Examples

```
fitLAD(0.9,0.9) # uniform LAD distribution
fitLAD(2.8,1.18)# planophile LAD distribution
fitLAD(1.1,1.7, plot=TRUE)# spherical LAD distribution
```

Index