

Package ‘javateak’

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Title Javanese Teak Above Ground Biomass Estimation

Description Simplifies the process of estimating above ground biomass components for teak trees using a few basic inputs, based on the equations taken from the journal “Allometric equations for estimating above ground biomass and leaf area of planted teak (*Tectona grandis*) forests under agroforestry management in East Java, Indonesia” (Purwanto & Shiba, 2006) <doi:10.60409/forestresearch.76.0_1>. This function is most reliable when applied to trees from the same region where the equations were developed, specifically East Java, Indonesia. This function help to estimate the stem diameter at the lowest major living branch (DB) using the stem diameter at breast height with $R^2 = 0.969$. Estimate the branch dry weight (WB) using the stem diameter at breast height and tree height ($R^2 = 0.979$). Estimate the stem weight (WS) using the stem diameter at breast height and tree height ($R^2 = 0.997$). Also estimate the leaf dry weight (WL) using the stem diameter at the lowest major living branch ($R^2 = 0.996$).

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Contents

DB	2
WB	2
WL	3
WS	4

Index	6
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DB

Stem Diameter at the Lowest Major Living Branch (DB)

Description

The Stem Diameter at the Lowest Major Living Branch (DB) is estimated using the stem diameter at breast height (DBH), based on the allometric equations from the journal *"Allometric Equations for Estimating Above-Ground Biomass and Leaf Area of Planted Teak (Tectona grandis) Forests Under Agroforestry Management in East Java, Indonesia"* (Purwanto & Shiba, 2006). The equation has a coefficient of determination R^2 of 0.969, indicating a high level of accuracy. This parameter is essential for estimating tree biomass components and is most reliable when applied to trees from the same region where the equations were developed, specifically East Java, Indonesia. All measurements are in units of centimeter.

Usage

DB(d)

Arguments

d (numeric) The stem diameter at breast height (DBH) in centimeters.

Value

The estimated stem diameter at the lowest major living branch (DB) in centimeters.

Examples

```
# Example: Estimating DB using stem diameter at breast height (DBH) = 30 cm
d <- 30 # Stem Diameter at Breast Height in cm
DB_result <- DB(d)
print(DB_result)

# Example: Handling missing value
d <- NA # Stem Diameter at Breast Height in cm
DB_result <- DB(d)
print(DB_result) # Should return NA because DBH is NA
```

WB

Branch Dry Weight (WB)

Description

The Branch Dry Weight (WB) is estimated using the stem diameter at breast height (DBH) in centimeter unit and tree height (H) in meter unit, based on the allometric equations from the journal "Allometric Equations for Estimating Above-Ground Biomass and Leaf Area of Planted Teak (*Tectona grandis*) Forests Under Agroforestry Management in East Java, Indonesia"* (Purwanto & Shiba, 2006). The equation has a coefficient of determination R^2 of 0.979, reflecting a strong fit. This parameter is crucial for biomass estimation and is most accurate when applied to trees in the same region as the original study, East Java, Indonesia. All measurements for DBH are in centimeter, tree height is in meter, and the output weight is in kilograms.

Usage

WB(d, h)

Arguments

d (numeric) The stem diameter at breast height (DBH) in centimeters.
h (numeric) The tree height in meters.

Value

The estimated branch dry weight (WB) in kilograms.

Examples

```
# Example: Estimating WB using DBH = 30 cm and tree height = 15 m
d <- 30 # Stem Diameter at Breast Height in cm
h <- 15 # Tree Height in meters
WB_result <- WB(d, h)
print(WB_result)

# Example: Handling missing or zero values
d <- NA # Stem Diameter at Breast Height in cm
h <- 15 # Tree Height in meters
WB_result <- WB(d, h)
print(WB_result) # Should return NA because DBH is NA

d <- 0 # Stem Diameter at Breast Height in cm
h <- 15 # Tree Height in meters
WB_result <- WB(d, h)
print(WB_result) # Should return 0 because DBH is 0
```

Description

The Leaf Dry Weight (WL) is estimated using the stem diameter at the lowest major living branch (DB) in centimeter unit, according to the allometric equations from the journal *"Allometric Equations for Estimating Above-Ground Biomass and Leaf Area of Planted Teak (Tectona grandis) Forests Under Agroforestry Management in East Java, Indonesia"* (Purwanto & Shiba, 2006). The equation has a coefficient of determination R^2 of 0.996, reflecting strong model fit. This estimation is most accurate when applied to trees in the same region as the study's sample, East Java, Indonesia. All measurements are in units of centimeter, and the output weight is in kilograms.

Usage

```
WL(db)
```

Arguments

db (numeric) The stem diameter at the lowest major living branch (DB) in centimeters.

Value

The estimated leaf dry weight (WL) in kilograms.

Examples

```
# Example: Estimating WL using stem diameter at the lowest major living branch (DB) = 30 cm
db <- 30 # Stem Diameter at the Lowest Major Living Branch in cm
WL_result <- WL(db)
print(WL_result)

# Example: Handling missing value
db <- NA # Stem Diameter at the Lowest Major Living Branch in cm
WL_result <- WL(db)
print(WL_result) # Should return NA because DB is NA
```

 WS

Stem Weight (WS)

Description

The Stem Weight (WS) is estimated using the stem diameter at breast height (DBH) in centimeter unit and tree height (H) in meter unit, following the allometric equations from the journal *"Allometric Equations for Estimating Above-Ground Biomass and Leaf Area of Planted Teak (Tectona grandis) Forests Under Agroforestry Management in East Java, Indonesia"* (Purwanto & Shiba, 2006). This equation has a coefficient of determination R^2 of 0.997, indicating a very high accuracy. The estimation is most reliable when used with trees from the East Java region, where the equations were derived. All measurements for DBH are in centimeter, tree height is in meter, and the output weight is in kilograms.

Usage

```
WS(d, h)
```

Arguments

```
d          (numeric) The stem diameter at breast height (DBH) in centimeters.  
h          (numeric) The tree height in meters.
```

Value

The estimated stem weight (WS) in kilograms.

Examples

```
# Example: Estimating WS using DBH = 30 cm and tree height = 15 m  
d <- 30 # Stem Diameter at Breast Height in cm  
h <- 15 # Tree Height in meters  
WS_result <- WS(d, h)  
print(WS_result)
```

```
# Example: Handling missing or zero values  
d <- NA # Stem Diameter at Breast Height in cm  
h <- 15 # Tree Height in meters  
WS_result <- WS(d, h)  
print(WS_result) # Should return NA because DBH is NA
```

```
d <- 0 # Stem Diameter at Breast Height in cm  
h <- 15 # Tree Height in meters  
WS_result <- WS(d, h)  
print(WS_result) # Should return 0 because DBH is 0
```

Index

DB, [2](#)

WB, [2](#)

WL, [3](#)

WS, [4](#)