

# Package ‘LAIr’

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**Type** Package

**Title** Converting NDVI to LAI of Field, Proximal and Satellite Data

**Version** 0.3.0

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**Description** Convert Leaf Area Index (LAI) from the Normalized Difference Vegetation Index (NDVI) using available equations from literature.

Detailed description of conversion equations in Bajocco et al. 2022 <[doi:10.3390/rs14153554](https://doi.org/10.3390/rs14153554)>.

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**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.2.3

**Depends** R (>= 2.10)

**Imports** dplyr, purrr, stringr, terra

**NeedsCompilation** no

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 NDVI2LAI

*Derive LAI from NDVI using a set of conversion functions*


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### Description

The function calculates LAI from NDVI values given as a raster or a numeric vector input. The conversion uses the formulas compiled by Bajocco et al. 2022 [doi:10.3390/rs14153554](https://doi.org/10.3390/rs14153554). The choice of the equation depends on arguments related to vegetation (category, type, name), or sensor (name, platform, resolution). If no filtering arguments are provided, the function calculate all 199 equations. The function returns a Raster\* or a dataframe depending on the input, with the LAI values computed from the available selected conversion equations.

### Usage

```
NDVI2LAI(input,
  ID=NULL,
  biome=NULL,
  category=NULL,
  type=NULL,
  name=NULL,
  sensor=NULL,
  platform=NULL,
  resolution=NULL)
```

### Arguments

input	Raster* or numeric vector. For multi-layer Raster images, the computation is performed for each layer.
ID	Character. Optional parameter to select the function based on its code. For available options, type 'NDVI2LAIeq' (field 'F.ID')
biome	Numeric. Optional integer representing the Biome, sensu Olson and Dinerstein 1998 <a href="https://doi.org/10.1046/j.15231739.1998.012003502.x">doi:10.1046/j.15231739.1998.012003502.x</a> . For available options, type 'NDVI2LAIeq' (field 'Location.Biome.Code' and 'Location.Biome').
category	Character. Optional parameter to select the Plant Category among: "Crop" "Forest" "Mixed".
type	Character. Optional parameter to select the Plant Type. For available options, type 'NDVI2LAIeq' (field 'Plant.Type')
name	Character. Optional parameter to select the Plant Name. For available options, type 'NDVI2LAIeq' (field 'Plant.Name')
sensor	Character. Optional parameter to select the Sensor Name. For available options, type 'NDVI2LAIeq' (field 'Sensor.Name')
platform	Character. Optional parameter to select the Sensor Platform among: "Satellite" "Field" "Airborne".
resolution	Character. Optional parameter to select the Sensor Resolution Class. For available options, type 'NDVI2LAIeq' (field 'Sensor.ResolutionClass')

**Value**

A Raster\* or a dataframe depending on the input.

**See Also**

Bajocco et al. (2022). On the Use of NDVI to Estimate LAI in Field Crops: Implementing a Conversion Equation Library. Remote Sens. , 3554, doi: [doi:10.3390/rs14153554](https://doi.org/10.3390/rs14153554)

**Examples**

```
#using a real raster:
file <- system.file('extdata/ndvi-italy.tiff', package='LAIr')
input <- terra::rast(file)
res <- NDVI2LAI(input, category = 'Crop', name = c('Vineyard', 'Barley'), sensor = 'MODIS')
terra::plot(res)

#using a vector
NDVI2LAI(seq(0.5,1,.2), category = 'Mixed', sensor = c('PROBA-V', 'SPOT'))
```

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NDVI2LAIeq	<i>Dataset of empirical functions to convert NDVI to LAI in crops, forests and mixed vegetation.</i>
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**Description**

Dataset of empirical functions to convert NDVI to LAI, compiled by [Bajocco et al. 2022](#). It contains some arguments used by the [NDVI2LAI\(\)](#) function to subset the conversion equations.

**Usage**

```
NDVI2LAIeq
```

**Format**

A data frame with 199 rows and 19 columns:

**Function.ID** Equation name.

**F.ID** Function ID code varying between F001 and F199.

**Plant.Category** Plant categories: "Crop" "Forest" "Mixed".

**Plant.Type** Plant types: "Permanent" "Summer" "Winter" "Forest" "Perennial" "Mixed".

**Plant.Name** Plant names: "Vineyard" "Maize" "Wheat" "Barley" "Forest" "Poplar" "Soybean" "Rice" "Sunflower" "Sugarcane" "Pasture" "Eucalypt" "Mixed".

**Location.Biome.Code** The Biome code of the experimental location, following Olson & Dinerstein (1998) [doi:10.1046/j.15231739.1998.012003502.x](https://doi.org/10.1046/j.15231739.1998.012003502.x)

**Location.Biome** The Biome name of the experimental location: "Mediterranean Forests, Woodlands & Scrub" "Temperate Grasslands, Savannas & Shrublands" "Temperate Broadleaf & Mixed Forests" "Deserts & Xeric Shrublands" "Tropical & Subtropical Dry Broadleaf Forests" "Montane Grasslands & Shrublands" "Tropical & Subtropical Grasslands, Savannas & Shrublands" "Tropical & Subtropical Moist Broadleaf Forests".

**Location.Country** Country.

**Sensor.Name** Sensor Names: "IKONOS" "MODIS" "Spectroradiometer" "Landsat" "AVHRR" "SPOT" "UAV" "Hyperion" "RapidEye" "Sentinel-2" "MultispectralCamera" "Quickbird" "WorldView2" "WorldView3" "Pleiades-1A" "GeoEye1" "AISA" "GF1" "HJ" "PROBA-V" "SPOT-VGT" "AWiFS" "BJ1"

**Sensor.Platform** Sensor Platform: "Satellite" "Field" "Airborne".

**Sensor.Resolution** Spatial resolution of the sensor.

**Sensor.ResolutionClass** Sensor spatial resolution class: "High" "Low" "Very-High" "Moderate".

**Sensor.PixelSize** Pixel size.

**Equation.R2** Coefficient of determination of the equation (when available).

**Equation.Codomain** The set of the function's possible outputs.

**Equation.Domain** The set of inputs accepted by the function.

**Equation.MathematicalForm** Mathematical form of the function: "Linear" "Logarithmic" "Exponential" "Polynomial" "Power".

**Reference.DOI** DOI of the publication.

**Function.call** Conversion formula used by the `NDVI2LAI()`

#### Source

[doi:10.3390/rs14153554](https://doi.org/10.3390/rs14153554)

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