

Package ‘TR8’

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Type Package

Title A tool for downloading functional traits data for plant species

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Description Plant ecologists often need to collect ``traits" data about plant species which are often scattered among various databases: TR8 contains a set of tools which take care of automatically retrieving some of those functional traits data for plant species from publicly available databases (Bioflor, The Ecological Flora of the British Isles, LEDA traitbase, Ellenberg values for Italian Flora, Mycorrhizal intensity database). The TR8 name, inspired by ``car plates" jokes, was chosen since it both reminds of the main object of the package and is extremely short to type.

License GPL (>= 2)

LazyData true

Encoding UTF-8

Depends R (>= 2.10), XML, RCurl, plyr, methods, taxize

Imports gWidgets

NeedsCompilation no

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R topics documented:

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TR8-package

TR8: a tool for retrieving functional traits data for plant species.

Description

This package provide a set of functions for extracting traits data for plant species from the following sources:

- Biolflor <http://www2.ufz.de/biolflor/index.jsp>
- Ecological Flora of the British Isles <http://www.ecoflora.co.uk/>
- LEDA traitbase <http://www.leda-traitbase.org/LEDAportal/>
- Ellenberg values for Italian Flora
- Mycorrhizal intensity database

Details

Package: TR8
 Type: Package
 Version: 1.0
 Date: 2014-02-27
 License: GPL>=2
 Depends: XML, RCurl, plyr, taxize

The easiest way of using the package is through the `tr8()` function, which accepts a vector of plant species names and returns a data frame containing traits data which have been found in the various sources. The TR8 name, inspired by "car plates" jokes, was chosen since it both reminds of the

main object of the package and is extremely short to type.

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

Please always use the following citations any time you use trait data retrieved with `tr8`

BiolFlor

Klotz, S., Kühn, I., Durka, W. (eds) (2002). BIOLFLOR - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde *38*: 1-333. (Bundesamt für. Bonn, Bundesamt für Naturschutz)

Ecoflora

Fitter, A. H. and Peat, H. J. (1994). The Ecological Flora Database, *J. Ecol.*, 82, 415-425. <http://www.ecoflora.co.uk>

LEDA traitbase Kleyer, M., Bekker, R.M., Knevel, I.C., Bakker, J.P, Thompson, K., Sonnenschein, M., Poschlod, P., Van Groenendael, J.M., Klimes, L., Klimesova, J., Klotz, S., Rusch, G.M., Hermy, M., Adriaens, D., Boedeltje, G., Bossuyt, B., Dannemann, A., Endels, P., Götzenberger, L., Hodgson, J.G., Jackel, A-K., Kühn, I., Kunzmann, D., Ozinga, W.A., Römermann, C., Stadler, M., Schlegelmilch, J., Steendam, H.J., Tackenberg, O., Wilmann, B., Cornelissen, J.H.C., Eriksson, O., Garnier, E., Peco, B. (2008). The LEDA Traitbase: A database of life-history traits of Northwest European flora. *Journal of Ecology* 96: 1266-1274.

Akhmetzhanova et al, 2012

Akhmetzhanova, A.A, Soudzilovskaia, N.A., Onipchenko, V.G., Cornwell, W. K., Agafonov, V. A., Selivanov, I.A., and Cornelissen, J. H. C. (2012): A rediscovered treasure: mycorrhizal intensity database for 3000 vascular plants species across the former Soviet Union. *Ecology* 93:689. <http://esapubs.org/Archive/ecol/E093/059/default.htm>

Pignatti et al., 2005

Pignatti, S., Menegoni, P., Pietrosanti, S. (2005). Biondificazione attraverso le piante vascolari. Valori di indicazione secondo Ellenberg (Zeigerwerte) per le specie della Flora d'Italia. *Braun-Blanquetia* 39, Camerino, pp. 97.

See Also

`bib()`

Examples

```
## download trait data for Abies alba and store
## them in a dataframe called My_traits (beware: at the moment
## setting gui_config=FALSE will only retrieve Ellenberg
## data from Italian Flora's species
My_traits<-tr8(species_list=c("Abies alba"),gui_config=FALSE)
```

biolflor_lookup	<i>biolflor_lookup</i>
-----------------	------------------------

Description

This dataframe is used to retrieve species URLs from the BiolFlor website (<http://www2.ufz.de/biolflor/index.jsp>).

Usage

```
biolflor_lookup
```

Format

A data frame with 3688 observations on the following 8 variables.

submittedname a character vector containing the original species' names as used in BiolFlor

acceptedname a character vector containing the accepted name according to the tnr function

sourceid a character vector; all the names are checked against the iPlant_TNRS database

score a character vector expressing the score for matching submitted and accepted names

matchedname name matched by the tnr function

V2 url of the BiolFlor web page for the species of interest

References

Please use the following citation any time you use data derived from BiolFlor:

Klotz, S., Kühn, I., Durka, W. (eds) (2002). BIOLFLORE - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde *38*: 1-333. (Bundesamt für Naturschutz, Bonn, Bundesamt für Naturschutz)

Examples

```
head(biolflor_lookup)
```

column_list	<i>column_list</i>
-------------	--------------------

Description

A list containing a brief description of traits data retrieved by the various databases; it's used as a hash table by some internal tr8 functions.

Format

Each element contains a key which express the short name for the traits that TR8 can download and to each key a three-elements vector is associated, which contains a shorter code for the trait, a long description of the trait and the reference database

height_max : c(h_max,maximum height,Ecoflora)
height_min : c(h_min,minimum height,Ecoflora)
leaf_area : c(le_area,leaf area,Ecoflora)
leaf_longevity : c(le_long,leaf longevity,Ecoflora)
Photosynthetic_pathway : c(phot_path,photosynthetic pathway,Ecoflora)
life_form : c(li_form,life form,Ecoflora)
Vegetative_reprod_method : c(reprod_meth,vegetative reprod method,Ecoflora)
Flowering_earliest_month : c(flw_early,flowering earliest month,Ecoflora)
Flowering_latest_month : c(flw_late,Flowering_latest_month,Ecoflora)
Pollen_vector : c(poll_vect,pollen vector,Ecoflora)
Seed_weight_mean : c(seed_wght,seed weight mean,Ecoflora)
Method_of_propagation : c(propag,Method of propagation,Ecoflora)
Ellenberg_light_Eco : c(ell_light_uk,Ellenberg light,Ecoflora)
Ellenberg_moisture_Eco : c(ell_moist_uk,Ellenberg moisture,Ecoflora)
Ellenberg_pH_Eco : c(ell_pH_uk,Ellenberg pH,Ecoflora)
Ellenberg_nitrogen_Eco : c(ell_N,Ellenberg nitrogen,Ecoflora)
Ellenberg_salt_Eco : c(ell_S,Ellenberg salt,Ecoflora)
canopy_height.m : c(c_height,canopy height in [m],LEDA)
mean.SLA..mm.2.mg. : c(SLA,mean specific leaf area [mm² m⁻¹],LEDA)
mean.SM..mg. : c(SM,mean seed mass,LEDA)
plant.growth.form : c(g_form,plant growth form,LEDA)
dispersal.type : c(displ_type,plant dispersal type,LEDA)
Life.form : c(li_form_B,life form,BiolFlor)
Life.span : c(li_span,life span,BiolFlor)
Rosettes : c(ros,Rosettes,BiolFlor)
Type.of.reproduction : c(reprod_B,Type of reproduction,BiolFlor)
Strategy.type : c(strategy,Strategy type,BiolFlor)
Pollen.vector : c(poll_vect_B,Pollen vector,BiolFlor)
Flower.class.after.MUELLER : c(flw_muell,Flower class after MUELLER,BiolFlor)
Begin.of.flowering..months. : c(flw_beg,Begin of flowering months.,BiolFlor)
End.of.flowering..months. : c(flw_end,End of flowering months,BiolFlor)
Duration.of.flowering..months. : c(flw_dur,Duration of flowering months,BiolFlor)
Number.of.flowering.phases : c(flw_ph,Number of flowering phases,BiolFlor)

L : c(ell_L_it,ellenberg value for light in Italy,Pignatti et al.)
T : c(ell_T_it,ellenberg value for temperature in Italy,Pignatti et al.)
C : c(ell_C_it,ellenberg value for continentality in Italy,Pignatti et al.)
U : c(ell_U_it,ellenberg value for humidity in Italy,Pignatti et al.)
R : c(ell_R_it,ellenberg value for soil reaction in Italy,Pignatti et al.)
N : c(ell_N_it,ellenberg value for nitrogen in Italy,Pignatti et al.)
S : c(ell_S_it,ellenberg value for salinity in Italy,Pignatti et al.)

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

BiolFlor

Klotz, S., Kühn, I., Durka, W. (eds) (2002). BIOLFLOR - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde *38*: 1-333. (Bundesamt für. Bonn, Bundesamt für Naturschutz)

Ecoflora

Fitter, A. H. and Peat, H. J. (1994). The Ecological Flora Database, J. Ecol., 82, 415-425. <http://www.ecoflora.co.uk>

LEDA traitbase Kleyer, M., Bekker, R.M., Knevel, I.C., Bakker, J.P, Thompson, K., Sonnenschein, M., Poschlod, P., Van Groenendael, J.M., Klimes, L., Klimesova, J., Klotz, S., Rusch, G.M., Hermy, M., Adriaens, D., Boedeltje, G., Bossuyt, B., Dannemann, A., Endels, P., Götzenberger, L., Hodgson, J.G., Jackel, A-K., Kühn, I., Kunzmann, D., Ozinga, W.A., Römermann, C., Stadler, M., Schlegelmilch, J., Steendam, H.J., Tackenberg, O., Wilmann, B., Cornelissen, J.H.C., Eriksson, O., Garnier, E., Peco, B. (2008). The LEDA Traitbase: A database of life-history traits of Northwest European flora. Journal of Ecology 96: 1266-1274.

Akhmetzhanova et al, 2012

Akhmetzhanova, A.A, Soudzilovskaia, N.A., Onipchenko, V.G., Cornwell, W. K., Agafonov, V. A., Selivanov, I.A., and Cornelissen, J. H. C. (2012): A rediscovered treasure: mycorrhizal intensity database for 3000 vascular plants species across the former Soviet Union. Ecology 93:689. URL: <http://esapubs.org/Archive/ecol/E093/059/default.htm>

Pignatti et al., 2005

Pignatti, S., Menegoni, P., Pietrosanti, S. (2005). Biondificazione attraverso le piante vascolari. Valori di indicazione secondo Ellenberg (Zeigerwerte) per le specie della Flora d'Italia. Braun-Blanquetia 39, Camerino, pp. 97.

Examples

```
## inspect the structure of the list
str(column_list)
```

ECOFLORA_df

ECOFLORA_df: local lookup table for Ecoflora species' url(s)

Description

This dataset is not ment to be directly accessed by the final user. It is imported by the `ecoflora()` function to extrapolate the correct URL for each species of interest and download the corresponding functional traits. This dataset is used as a lookup table from the `ecoflora()` function.

Format

A data frame containing URL for the 1879 species contained in the Ecoflora web database.

species a vector containing the species names as defined on Ecoflora website

web_link a character vector containing the URL of each species trait web page

acceptedname a character vector containing the accepted name according to TNRS

sourceid a character vector containing the source used by the `taxize::tnrs` function

score a numeric vector containing the score obtained by `taxize::tnrs` function

matchedname a character vector containing the matched names by `taxize::tnrs`

uri a character vector containing Ecoflora-URL for each species

References

Please always cite the database according to:

Fitter, A . H. and Peat , H. J., 1994, The Ecological Flora Database, J. Ecol., 82, 415-425.

Examples

```
## observe the data for the first few species
head(ECOFLORA_df)
```

leda_download_to_local_directory

A utility to download a local copy of the LEDA data files.

Description

Allows the user to retrieve the data files from the LEDA Traitbase website, merge them in a single R dataset and store the result in a local file; this file could be then used whenever the `tr8()` function is used in order to speed up the process of retrieving traits data.

Usage

```
leda_download_to_local_directory()
```

Details

The function uses a GUI created via the `gWidgets` package, to let the user select a folder where the datasets has to be stored.

Value

The function save a local copy of LEDA data in a file called `leda_database.Rda`.

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

Kleyer, M., Bekker, R.M., Knevel, I.C., Bakker, J.P, Thompson, K., Sonnenschein, M., Poschlod, P., Van Groenendael, J.M., Klimes, L., Klimesova, J., Klotz, S., Rusch, G.M., Hermy, M., Adriaens, D., Boedeltje, G., Bossuyt, B., Dannemann, A., Endels, P., Götzenberger, L., Hodgson, J.G., Jackel, A-K., Kühn, I., Kunzmann, D., Ozinga, W.A., Römermann, C., Stadler, M., Schlegelmilch, J., Steendam, H.J., Tackenberg, O., Wilmann, B., Cornelissen, J.H.C., Eriksson, O., Garnier, E., Peco, B. (2008): The LEDA Traitbase: A database of life-history traits of Northwest European flora. *Journal of Ecology* 96: 1266-1274. http://www.leda-traitbase.org/LEDAportal/data_files.jsp

See Also

`tr8()`

Examples

```
## Dont' run
## leda_download_to_local_directory()
```

leda_lookup	<i>List with reference variables needed to download traits from LEDA Traitbase</i>
-------------	--

Description

Contains useful references for the LEDA Traitbase: these data are used by the TR8 package to find URLs of the different .txt files containing the raw data.

Usage

```
data(leda_lookup)
```

Format

Each element contains a key which express the short name for the traits of interest (to be retrieved from the LEDA Traitbase), to each key a four-elements vector is associated, which contains the name of the .txt files hosted at the LEDA website which contains the trait data, a int which expresses the number of rows to be skipped when reading the txt file, a longer code for the trait, a short code for the trait.

age_of_first_flowering
branching
bud_bank_seasonality_soil
buoyancy
canopy_height
dispersal
leaf_distribution
leaf_dmc
leaf_mass
leaf_size
dispersal_morphology
growth_form
life_span
releasing_height
sbank
seed_mass
shoot_growth_form
seed_number_per_shoot
woodiness
terminal_velocity

Source

<http://www.leda-traitbase.org/LEDAportal/citation.jsp>

References

Please cite the following reference any time you use data retrieved from the LEDA traitbase:

Kleyer, M., Bekker, R.M., Knevel, I.C., Bakker, J.P, Thompson, K., Sonnenschein, M., Poschlod, P., Van Groenendael, J.M., Klimes, L., Klimesova, J., Klotz, S., Rusch, G.M., Hermy, M., Adriaens, D., Boedeltje, G., Bossuyt, B., Dannemann, A., Endels, P., Götzenberger, L., Hodgson, J.G., Jackel, A-K., Kühn, I., Kunzmann, D., Ozinga, W.A., Römermann, C., Stadler, M., Schlegelmilch, J., Steendam, H.J., Tackenberg, O., Wilmann, B., Cornelissen, J.H.C., Eriksson, O., Garnier, E., Peco, B. (2008): The LEDA Traitbase: A database of life-history traits of Northwest European flora. *Journal of Ecology* 96: 1266-1274.

Examples

```
head(leda_lookup)
```

```
list_of_traits_Biolflor
```

list_of_traits_Biolflor

Description

a vector containing traits that can be downloaded from Biolflor

Format

A vector of plant traits

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

Please use the follow citation ay time you use data derived from Biolflor:

Klotz, S., Kühn, I., Durka, W. (eds) (2002). BIOLFLORE - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde *38*: 1-333. (Bundesamt für. Bonn, Bundesamt für Naturschutz)

Examples

```
## have a look at the first rows of the dataset
head(list_of_traits_Biolflor)
```

```
pignatti
```

pignatti

Description

pignatti is a dataframe containing traits data for italian species

Format

Contains the following traits data about Italian Flora species

Specie.Pignatti : species name in the original dataset

numero : numeric code

codice : numeric code

nome.scientifico : scientific name with authors

forma_biologica : life form

corotipo : distribution of species

L : Ellenberg value for light

T : Ellenberg value for temperature

C : Ellenberg value for continentality

U : Ellenberg value for soil humidity

R : Ellenberg value for soil pH

N : Ellenberg value for Nutrients in the soil

S : Ellenberg value for soil salinity

Name.tnrs : species name according to tnrs

References

Pignatti, S., Menegoni, P., Pietrosanti, S., 2005, Biondificazione attraverso le piante vascolari. Valori di indicazione secondo Ellenberg (Zeigerwerte) per le specie della Flora d'Italia. Braun-Blanquetia 39, Camerino, pp. 97.

Examples

```
## inspect the first rows of the dataset
head(pignatti)
```

tr8

tr8: *retrieving functional traits data from various databases.*

Description

tr8 makes internally use of other functions provided by the TR8 package in order to query various databases and provide the user with a dataframe containing traits data for the species of interest. At the moment the following databases are available:

- Biolflor <http://www2.ufz.de/biolflor/index.jsp>
- Ecological Flora of the British Isles <http://www.ecoflora.co.uk/>
- LEDA traitbase <http://www.leda-traitbase.org/LEDAportal/>
- Ellenberg values for Italian Flora
- Mycorrhizal intensity database

Usage

```
tr8(species_list, gui_config = TRUE)
```

Arguments

`species_list` a vector containing names of the plant species for which traits data want to be extracted.

`gui_config` if set to TRUE a GUI for selecting traits of interest is shown (default is TRUE)

Value

data.frame containing various traits data for the species of interest

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

Please always use the following citations any time you use trait data retrieved with tr8

BiolFlor

Klotz, S., Kühn, I., Durka, W. (eds) (2002). BIOLFLOR - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde *38*: 1-333. (Bundesamt für. Bonn, Bundesamt für Naturschutz)

Ecoflora

Fitter, A . H. and Peat , H. J. (1994). The Ecological Flora Database, J. Ecol., 82, 415-425. <http://www.ecoflora.co.uk>

LEDA traitbase Kleyer, M., Bekker, R.M., Knevel, I.C., Bakker, J.P, Thompson, K., Sonnenschein, M., Poschlod, P., Van Groenendael, J.M., Klimes, L., Klimesova, J., Klotz, S., Rusch, G.M., Hermy, M., Adriaens, D., Boedeltje, G., Bossuyt, B., Dannemann, A., Endels, P., Götzenberger, L., Hodgson, J.G., Jackel, A-K., Kühn, I., Kunzmann, D., Ozinga, W.A., Römermann, C., Stadler, M., Schlegelmilch, J., Steendam, H.J., Tackenberg, O., Wilmann, B., Cornelissen, J.H.C., Eriksson, O., Garnier, E., Peco, B. (2008). The LEDA Traitbase: A database of life-history traits of Northwest European flora. *Journal of Ecology* 96: 1266-1274.

Akhmetzhanova et al, 2012

Akhmetzhanova, A.A, Soudzilovskaia, N.A., Onipchenko, V.G., Cornwell, W. K., Agafonov, V. A., Selivanov, I.A., and Cornelissen, J. H. C. (2012): A rediscovered treasure: mycorrhizal intensity database for 3000 vascular plants species across the former Soviet Union. *Ecology* 93:689. <http://esapubs.org/Archive/ecol/E093/059/default.htm>

Pignatti et al., 2005

Pignatti, S., Menegoni, P., Pietrosanti, S. (2005). Biondificazione attraverso le piante vascolari. Valori di indicazione secondo Ellenberg (Zeigerwerte) per le specie della Flora d'Italia. *Braun-Blanquetia* 39, Camerino, pp. 97.

See Also

bib()

Examples

```
## download trait data for Abies alba (beware: at the moment
## setting gui_config=FALSE will only retrieve Ellenberg
## data from Italian Flora's species
My_traits<-tr8(species_list=c("Abies alba"),gui_config=FALSE)
```

Tr8-class

Class "Tr8"

Description

Class Tr8 is used as a "container" for all other functions and classes needed to download traits data from various databases

Objects from the Class

Objects can be created by calls of the form `new("Tr8", ...)`.

Slots

species_list: Object of class "vector" list of species for which traits data are to be searched
results: Object of class "data.frame" dataframe containing scraped traits
not_valid: Object of class "vector" species whose name were not present in the Ecoflora database
double_names: Object of class "vector" species for which more than one name was found

Methods

bib signature(.Object = "Tr8"): method to get bibliographic references for the downloaded data
issues signature(.Object = "Tr8"): method to underline 'problematic' species
extract_traits signature(object = "Tr8"): method to extract the object@results dataframe from a Tr8 object
lookup signature(.Object = "Tr8"): a method to show brief reference for the downloaded data

Note

Additional datasets may be added in future.

Author(s)

Gionata Bocci <boccionata@gmail.com>

See Also[tr8](#)**Examples**

```
## the bib() methods let the user have the exact
## bibliographic citations to be used for the
## retrieved data

## download trait data for Abies alba (beware: at the moment
## setting gui_config=FALSE will only retrieve Ellenberg
## data from Italian Flora's species)
My_traits<-tr8(species_list=c("Abies alba"),gui_config=FALSE)

## See what citations should be used for the data
bib(My_traits)

## to see a short explanation for the codes used to identify
## the traits use lookup()

lookup(My_traits)
```

tr8_config

tr8_config *a GUI to configure TR8 package.*

Description

This function will make a simple GUI appear which contains a tab for each trait database: the user can choose which traits should be downloaded by the tr8 function.

Usage

```
tr8_config()
```

Value

Returns a list containing the selected traits for each source of information

Author(s)

Gionata Bocci <boccigionata@gmail.com>

See Also

[tr8\(\)](#)

 traits_eco

 Set of functional traits to be retrieved by Ecoflora.

Description

traits_eco defines a list containing pairs in the form *short_name_of_the_trait = corresponding_code_in_Ecoflora*. At the moment the package does not download all the traits available at Ecoflora; curious users can expand the number of downloadable traits simply extending the list with other 'pairs' (take care of using the right Ecoflora codes as described in http://www.ecoflora.co.uk/search_plantchar.php).

Format

The format is: a list of the following 17 elements, where each element is a pair of the form "traits": "code used in Ecoflora HTML code":

height_max : num 3.05
height_min : num 3.06
leaf_area : num 3.17
leaf_longevity : num 3.22
Photosynthetic_pathway : num 4.02
life_form : num 5.01
Vegetative_reprod_method : num 5.05
Flowering_earliest_month : num 5.07
Flowering_latest_month : num 5.08
Pollen_vector : num 5.15
Seed_weight_mean : num 5.34
Method_of_propagation : num 5.52
Ellenberg_light_Eco : num 7.14
Ellenberg_moisture_Eco : num 7.15
Ellenberg_pH_Eco : num 7.16
Ellenberg_nitrogen_Eco : num 7.17
Ellenberg_salt_Eco : num 7.18

References

Fitter, A . H. and Peat , H. J., 1994, The Ecological Flora Database, J. Ecol., 82, 415-425. <http://www.ecoflora.co.uk>

Examples

```
## observe the structure of the dataset
str(traits_eco)
```

traits_pollen_Biolflor
traits_pollen_Biolflor

Description

a vector containing traits that can be downloaded from Biolflor

Format

A vector of plant traits

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

Please use the follow citation ay time you use data derived from Biolflor:

Klotz, S., Kühn, I., Durka, W. (eds) (2002). BIOLFLORE - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde *38*: 1-333. (Bundesamt für. Bonn, Bundesamt für Naturschutz)

Examples

```
## Not run:  
#data(traits_pollen_Biolflor)  
  
## End(Not run)
```

traits_special_Biolflor
traits_special_Biolflor

Description

a vector containing traits that can be downloaded from Biolflor for which some special Xpaht rules must be applied

Format

A vector of plant traits

Author(s)

Gionata Bocci <boccigionata@gmail.com>

References

Please use the follow citation ay time you use data derived from Biolflor: BIOLFLOR - Eine Datenbank zu biologisch-ökologischen Merkmalen zur Flora von Deutschland. Schriftenreihe für Vegetationskunde 38: 1-333. (Bundesamt für. Bonn, Bundesamt für Naturschutz)

Examples

traits_special_Biolflor

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