

Package ‘rapsimng.lupin’

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Title Crop-Specific Functions and Parameters for APSIM Next Generation
Lupin Model

Version 0.1.0

Description Provides lupin-specific functions, processes and parameter sets used by
lupin model in the Agricultural Production Systems sIMulator ('APSIM') Next Generation.
Includes tools for crop process calculations, parameter management and customisation,
enabling users to explore, modify and apply lupin model components.

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Encoding UTF-8

Depends R (>= 4.1.0)

Imports optree (>= 0.1.1), tidyweather (>= 0.3.0)

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

URL <https://lupin.rapsimng.bangyou.me/>,
<https://github.com/byzheng/rapsimng.lupin>

BugReports <https://github.com/byzheng/rapsimng.lupin/issues>

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Author Bangyou Zheng [aut, cre]

Maintainer Bangyou Zheng <zheng.bangyou@gmail.com>

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lupin

*lupin model options manager***Description**

An options manager for configuring lupin model parameters. This object provides methods to get and set lupin related parameters.

Usage

```
lupin
```

Value

An option manager object for configuring lupin model parameters.

Available Options

phenology.thermal_time.x Cardinal temperatures for thermal time calculation. Default: c(2, 30, 35)

phenology.thermal_time.y Effective thermal time at corresponding cardinal temperatures. Default: c(0, 28, 0)

phenology.thermal_time.method Method used for thermal time calculation. Supported values: "3hr" and "HourlySinPpAdjusted". Default: "HourlySinPpAdjusted"

phenology.vernalisation_time.x Cardinal temperatures for vernalisation time calculation. Default: c(0, 2, 8, 15)

phenology.vernalisation_time.y Effective vernalisation time at corresponding cardinal temperatures. Default: c(0, 1, 0.5, 0.0)

Methods

get(key) Retrieve the value of an option by its key (e.g., "phenology.thermal_time.x")

set(key, value) Set the value of an option by its key

reset() Reset all options to their default values

Examples

```
# Get default thermal time cardinal temperatures
lupin$get("phenology.thermal_time.x")

# Get default vernalisation time parameters
lupin$get("phenology.vernalisation_time.x")
lupin$get("phenology.vernalisation_time.y")

# Set custom values
lupin$set("phenology.thermal_time.x" = c(0, 25, 40))
```

```
lupin$set("phenology.thermal_time.y" = c(0, 25, 0))

# Reset to defaults
lupin$reset()
```

thermal_time	<i>Calculate thermal time using cardinal temperatures</i>
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Description

Calculate thermal time using cardinal temperatures

Usage

```
thermal_time(
  mint,
  maxt,
  x_temp = lupin$get("phenology.thermal_time.x"),
  y_temp = lupin$get("phenology.thermal_time.y"),
  method = lupin$get("phenology.thermal_time.method"),
  ...
)
```

Arguments

mint	The minimum temperature
maxt	The maximum temperature
x_temp	The cardinal temperatures using to calculate thermal time. The default values are c(2, 30, 35) defined in lupin\$get("phenology.thermal_time.x").
y_temp	The effective thermal time at the corresponding cardinal temperatures. The default values are c(0, 28, 0) defined in lupin\$get("phenology.thermal_time.y").
method	The method to calculate thermal time. The default is "HourlySinPpAdjusted". Other options are "3hr" and NULL (mean temperature).
...	Additional arguments passed to the underlying tidyweather::thermal_time function.

Details

The daily thermal time is calculated by interpolating the effective thermal time at three hour intervals between the daily minimum and maximum temperatures, and then averaging these values to get the daily thermal time. For more information about the lupin phenology model, see the [APSIM Next Generation Lupin Documentation](#).

Value

The thermal time.

Examples

```

mint <- c(0, 10)
maxt <- c(30, 40)
date <- as.Date(c("2024-01-01", "2024-01-02"))
thermal_time(mint, maxt, date = date, lat = -27)

```

vernalisation_days	<i>Calculate vernalisation time using cardinal temperatures</i>
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Description

Calculate vernalisation time using cardinal temperatures

Usage

```

vernalisation_days(
  mint,
  maxt,
  x_temp = lupin$get("phenology.vernalisation_time.x"),
  y_temp = lupin$get("phenology.vernalisation_time.y")
)

```

Arguments

mint	The minimum temperature
maxt	The maximum temperature
x_temp	The cardinal temperatures used to calculate vernalisation time. The default values are defined in <code>lupin\$get("phenology.vernalisation_time.x")</code> .
y_temp	The effective vernalisation time at the corresponding cardinal temperatures. The default values are defined in <code>lupin\$get("phenology.vernalisation_time.y")</code> .

Details

The daily vernalisation time is calculated by interpolating the effective vernalisation time at three hour intervals between the daily minimum and maximum temperatures, and then averaging these values to get the daily vernalisation time.

Value

The vernalisation time (days).

Examples

```

mint <- c(0, 10)
maxt <- c(30, 40)
vernalisation_days(mint, maxt)

```

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