Package 'rapsimng.lentil'

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

Version 0.1.1

Description Provides lentil-specific functions, processes and parameter sets used by lentil 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 lentil model components.

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Depends R (>= 4.1.0)

Imports optree (>= 0.1.1), tidyweather (>= 0.3.3)

Suggests testthat (>= 3.0.0)

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URL https://lentil.rapsimng.bangyou.me/, https://github.com/byzheng/rapsimng.lentil

BugReports https://github.com/byzheng/rapsimng.lentil/issues

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Author Bangyou Zheng [aut, cre]

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

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Contents

lentil 2
thermal_time 3
vernalisation_days 4

Index **5**

`lentil` *lentil model options manager*

Description

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

Usage

```
lentil
```

Value

An option manager object for configuring lentil 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
lentil$get("phenology.thermal_time.x")

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

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

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

`thermal_time` *Calculate thermal time using cardinal temperatures*

Description

Calculate thermal time using cardinal temperatures

Usage

```
thermal_time(
  mint,
  maxt,
  x_temp = lentil$get("phenology.thermal_time.x"),
  y_temp = lentil$get("phenology.thermal_time.y"),
  method = lentil$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 lentil$get("phenology.thermal_time.x").
`y_temp`	The effective thermal time at the corresponding cardinal temperatures. The default values are c(0, 28, 0) defined in lentil$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 lentil phenology model, see the APSIM Next Generation Lentil 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` *Calculate vernalisation time using cardinal temperatures*

Description

Calculate vernalisation time using cardinal temperatures

Usage

```
vernalisation_days(
  mint,
  maxt,
  x_temp = lentil$get("phenology.vernalisation_time.x"),
  y_temp = lentil$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 lentil$get("phenology.vernalisation_time.x").
`y_temp`	The effective vernalisation time at the corresponding cardinal temperatures. The default values are defined in lentil$get("phenology.vernalisation_time.y").

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)
```

Index

lentil, 2

thermal_time, 3

vernalisation_days, 4