Title : R script to simulate the phenology of the pine processionary moth, Thaumetopoea pityocampa, from the egg to the last larval instar (L5).

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Text :

This folder contains :

- ReadMe file with the following explanation

- the R script to simulate the phenology of the pine processionary moth (PPM_phenological_model.R),

- the flight curve of the pine processionary moth in Orleans (France) in 2019 (Flight_Orleans_2019.csv ; col 1 = date, col 2 = number of adult catches, col 3 = cumulated number of catches)

- temperature dataset from June 2019 to December 2020 (Temperature.csv; col 1 = mean daily temperature, col 2 = Date, col 3 = Julian day continuously counted from one year to another). These meteorological data were recorded by the agroclimatic station at Orleans (number 45234, north latitude 47.827 °, east longitude 1.909 °), part of the INRAE national agroclimatic network managed by the service unit AgroClim (Avignon, France).

The R script was used in R version 3.5.1 (2018-07-02)

The R script will call automatically the flight curve and the temperature dataset given that you have placed them in your working directory, it requires the following R packages : lubridate, hydroGOF, ggplot2 (to be installed beforehand). The function coded to simulate the phenology of the pine processionary moth is called « param ». Input parameters are :
- Rm (Maximal development rate in days^(-1)),
- Tm (Optimum temperature in °C)
- To (Spread of curve in °C)
for each life stage from the egg to L5.
This phenology model accumulates the daily development rate given by the Taylor equation and provides for each life stage (resegg, resL1,… resL5) : "min First day" (first day with an individual entering at this stage), "max First day" (last day with an individual entering at this stage), "min Last day" (first day with an individual achieving this stage development), "max Last day" (last day with an individual achieving this stage development), "mean duration" (mean duration of this life stage across all individuals). This is a summary of the phenology but “tabnb” provides the number of individuals present in each stage according to the date.

To download the software R, please visit: https://www.r-project.org/

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