equations

2024-06-18

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.2     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.4.3     v tibble    3.2.1
## v lubridate 1.9.2     v tidyr     1.3.0
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(magrittr)
```

```
##
## Attaching package: 'magrittr'
##
## The following object is masked from 'package:purrr':
##
##     set_names
##
## The following object is masked from 'package:tidyr':
##
##     extract
```

```
library(deSolve)
```

$$\frac{dR}{dt} = -fRS$$

$$\frac{dR}{dt} = -L^{\gamma} f' RS$$

$$f = f' L^{\gamma}$$

$$\frac{dR}{dt} = -L^{\gamma} f' e^{T_A(1/T_R - 1/T)} RS$$

$$f = f' L^{\gamma} e^{T_A(1/T_R - 1/T)}$$

$$\frac{dR}{dt} = -\frac{f' L^\gamma RS}{1 + fL^\gamma hR}$$

$$f = \frac{f' L^\gamma}{1 + f' L^\gamma hR}$$

$$\frac{dR}{dt} = -\frac{f' e^{T_A(1/T_R - 1/T)} L^\gamma RS}{1 + f' e^{T_A(1/T_R - 1/T)} L^\gamma hR}$$

$$\frac{dR}{dt} = -\frac{f' e^{T_A(1/T_R - 1/T)} L^\gamma RS}{1 + f' L^\gamma hR}$$

$$f = \frac{f' e^{T_A(1/T_R - 1/T)} L^\gamma}{1 + f' e^{T_A(1/T_R - 1/T)} L^\gamma hR}$$

$$h = h' + \omega T$$

$$h = h' e^{\omega T}$$

$$\frac{dR}{dt} = -L^\gamma fR(S + I)$$

$$\frac{dS}{dt} = -uL^\gamma fZS$$

$$\frac{dI}{dt} = uL^\gamma fZS$$

$$\frac{dZ}{dt} = -L^\gamma fZ(S + I)$$

$$\frac{dR}{dt} = -fR(S + I)$$

$$\frac{dS}{dt} = -ufZS$$

$$\frac{dI}{dt} = ufZS$$

$$\frac{dZ}{dt} = -fZ(S + I)$$

$$u = u'$$

$$u = u' e^{T_A(1/T_R - 1/T)}$$

$$u = u' e^{\rho[R]}$$

$$u = u' e^{T_A(1/T_R - 1/T)} e^{\rho[R]}$$

$$u = u' e^{T_A(1/T_R - 1/T)} e^{\rho[R]} e^{\phi[R]T}$$

$$\rho = \begin{cases} \rho_{15}, \ T = 15 \\ \rho_{20}, \ T = 20 \\ \rho_{25}, \ T = 25 \end{cases}$$

$$\beta = contact\ rate\ \cdot probability\ of\ infection\ given\ contact$$

$$\beta = foraging\ rate\ \cdot probability\ of\ infection\ per\ spore\ consumed$$

$$\beta = f \cdot u$$

$$L = length$$

$$\gamma = scaling\ parameter$$