BioSIM' Survival Models

Standardized Parameters

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General Parameters	k, k_0, k_1, k_2, kk, kk_1, kk_2
Temperature	T °C
Lower	T_L °C
Optimum	T_o °C
Upper	T_H °C
Temperature scale	Δ_T, Δ_{T_L}, Δ_{T_H}

01• Survival_01

$$\frac{1}{1+e^{k_0+k_1 T+k_2 T^2}}$$

02• Survival_02

$$\frac{1}{1+e^{k_0+k_1 T+k_2 T^{kk}}}$$

03• Survival_03

$$1-\frac{1}{1+k\, e^{-kk\left(\frac{T-T_o}{\Delta T}\right)^2}}$$

04• Survival_04

$$k\, e^{-\left(\frac{T-T_o}{\Delta T}\right)^2}$$

05• Survival_05

$$k_0+k_1 e^{-\left(\frac{T-T_o}{\Delta T}\right)^2}$$

06• Survival_06

$$k_0+k_1 e^{-kk\frac{\ln\left(\left|\frac{T}{T_o}\right|\right)^2}{\Delta T}}$$

07• Survival_07

$$k_0 + k_1 T + k_2 T^{kk}$$

08• Survival_08

$$1 - e^{k_0 + k_1 T + k_2 T^{-kk}}$$

09• Survival_09

$$\frac{kk_1}{1 + kk_2\, e^{k_0 + k_1 T + k_2 T^{kk}}}$$

10• Survival_10

$$\frac{1}{e^{kk\left(1+e^{-\frac{T-T_L}{\Delta T_L}}\right)\left(1+e^{-\frac{T_H-T}{\Delta T_H}}\right)}}$$

11• Survival_11

$$\frac{k}{e^{\left(1+e^{-\frac{T-T_o}{\Delta T_L}}\right)}\left(1+e^{-\frac{T_o-T}{\Delta T_H}}\right)}$$

12• Survival_12

$$\frac{k}{e^{\left(1+e^{-\frac{T-T_L}{\Delta T_L}}\right)}\left(1+e^{-\frac{T_H-T}{\Delta T_H}}\right)}$$

13• Survival_13

$$1 - k\left(1 - e^{-\frac{T - T_L}{\Delta T}}\right)\left(1 - e^{-\frac{T_H - T}{\Delta T}}\right)$$

14• Survival_14

$$1 - e^{kk\left(1 - e^{-\frac{T - T_L}{\Delta T_L}}\right)\left(1 - e^{-\frac{T_H - T}{\Delta T_H}}\right)}$$

15• Survival_15

$$k_0 + k_1\, e^{kk_1\, T} + k_2\, e^{kk_2\, T}$$

16• Survival_16

$$\frac{1}{e^{kk\left(1+ e^{-\frac{T - T_O}{\Delta T_L}}\right)\left(1+ e^{-\frac{T_O - T}{\Delta T_H}}\right)}}$$

Reference

Sporleder M, Tonnang HEZ, Carhuapoma P, Gonzales JC, Juarez H, Kroschel J. 2013. Insect Life Cycle Modeling (ILCYM) software a new tool for Regional and Global Insect Pest Risk Assessments under Current and Future Climate Change Scenarios. In: Peña JE, ed. Potential invasive pests of agricultural crops. Wallingford: CABI https://doi.org/10.1079/9781845938291.0412