Determination of the parameters for a day-degree method to predict the flight of host populations of *Hyalesthes obsoletus*

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Life history of *Hyalesthes obsoletus*

- Soil inhabiting Cixiid – only adult planthoppers occur above ground
- Specific host-populations are associated with bindweed and nettle
Temperature is a major abiotic determinant for the life history of arthropods

- Calculation of accumulated heat units allows prediction of life history parameters

  - Required parameters:
    - Starting date (Biofix)
    - Temperature threshold (Basis)
    - Temperature sums required for the occurrence of a particular event

  - Parameters are often unknown
    - Use of “standard” values
    - “Trial and Error”
    - Use of empirical field data to estimate appropriate combinations of parameters (inverse modelling)
Flight activity data of *H. obsoletus* including data of M. Breuer, U. Ipach and M. Stark-Urnau

Start of flight activity of host populations of *Hyalesthes obsoletus*
Temperature dependence of the flight of adult *H. obsoletus*

Start of flight activity related to accumulated T-units from March 1 to the start of flight

- C.a.-populations
- U.d.-populations
Calculation and optimization of the necessary parameters for a degree-day method

Field data on flight activity

Starting date:
- \(d_{\text{min}} \ldots d_{\text{max}}; \Delta d=1\)

Threshold-Temp.:
- \(T_{\text{min}} \ldots T_{\text{max}}; \Delta T \text{ variabel}\)

Weather-data

Temp-Sums

Comparison

Observed <> Calculated

- Days: - Range,
  - Mean, SE

- T-Sum: - Range
  - Mean, SE
  - abs. + rel.

- Mean

- STD, SE, RCV
**Calculation and optimization of the parameters for a degree-day method**

**Definition of parameter variation**

<table>
<thead>
<tr>
<th></th>
<th>Parameter</th>
<th>Start-Datum</th>
<th>End-Datum</th>
<th>Start-Param</th>
<th>End-Param</th>
<th>Inkrement</th>
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**Field observation and weather data**

List of results

**Calculation and optimization of the parameters for a degree-day method**

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Calculation and optimization of the parameters for a degree-day method

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<th>D</th>
<th>E</th>
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Field observation data

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List of results

RCV Range (d) STD (d) % mean dev. Tsum
Current parameters used to predict the flight of the host populations of *H. obsoletus*

**Bindweed populations**
- Start of DD-summation: March 9
- T-Threshold: 5.8 °C
- Start of flight: 1053 DD

**Nettle populations**
- Start of DD-summation: April 1
- T-Threshold: 5 °C
- Start of flight: 1160 DD
Current parameters used to predict the flight of the host populations of *H. obsoletus*

Comparison of calculated and observed flight data