A review on the use of hoverflies as bioindicators (*Diptera, Syrphidae*)

1. bioindication in general
2. syrphids & bioindication
3. recommendations
4. interesting approaches

Frank Dziock &
Jean-Pierre Sarthou

historical example: "canary in a coalmine"

used to indicate toxic gases in coal mines from 1912 till 1996

B i o i n d i c a t o r s

definition

species or species groups that reflect a set of particular environmental conditions through their presence/absence, abundance or condition

goals of this study

- review existing attempts to use hoverflies in bioindication
- evaluate these studies
- give recommendations for future work

subjective review!

but we tried to incorporate objective criteria

syrphids in bioindication studies

- 61 studies published in 68 papers from 1980 - 2004
- most (80%) in non peer-reviewed journals
- bias on Central Europe

three general goals of bioindication

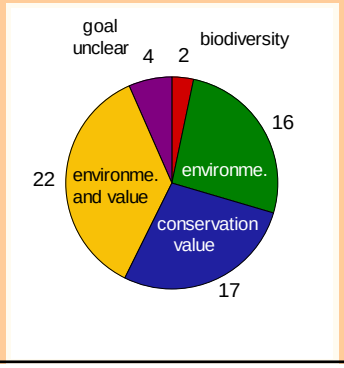
1. environmental

2. biodiversity

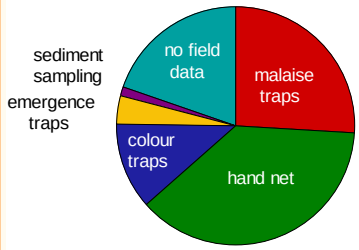
3. conservation value

Presentation given at the 3rd Syrphidae Symposium, Leiden, The Netherlands, 2nd to 5th September, 2005

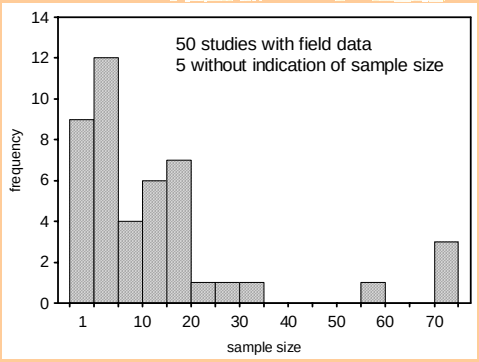
goal of the studies



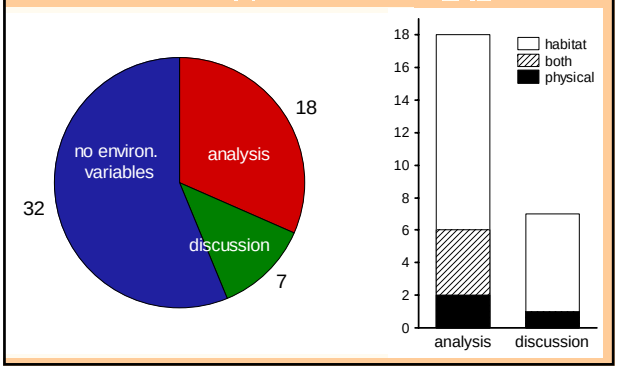
field methods



no. of sites - sample size



field data – environmental variables



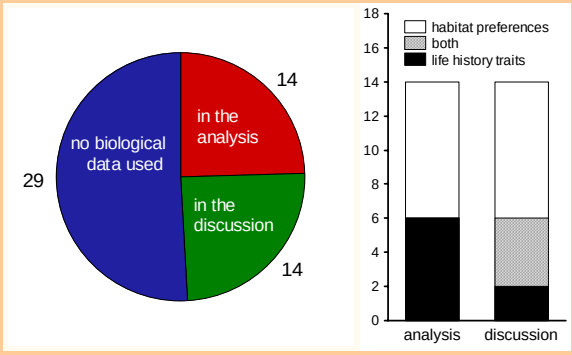
field data – environmental variables

environmental bioindication: 16 studies

- only four have measured physical parameters, the others habitat data

⇨ potential of syrphids for indicating „hard“ environmental data, e.g. soil properties, inundation frequency etc. has not often been studied

use of biological data



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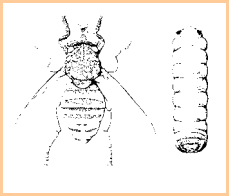
use of biological data

half of the studies ignore the existence of any biological data related to syrphids!

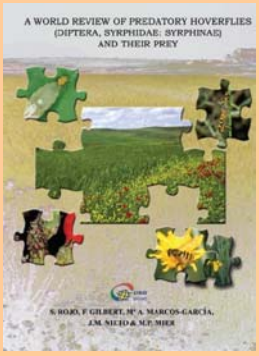
sources of syrphid biological data I

SYRPH THE NET: THE DATABASE OF EUROPEAN SYRPHIDAE (DIPTERA)
Series Editors: Martin C.D. Speight, Emmanuel Castella, Jean-Pierre Sarthou & Claude Monteil



- 635 European species covered
- very detailed data on habitat preferences
- biological trait data
- all data fuzzy coded in Excel spread sheets

sources of syrphid biological data II



Rojo, Gilbert, Marcos-Garcia, Nieto & Mier 2003

- review of all known prey-predator relationships in the Syrphinae worldwide
- catalogue in tables and on CD

sources of syrphid biological data III

Barkemeyer 1994

(out of print)

- 301 species from Northern Germany
- very detailed species accounts
- 1,500 references

shortcomings of this review

- geographical bias (mainly Central Europe)
- few studies in peer-reviewed journals (information often hard to interprete, e.g. methods incomplete)
- subjective view:
  - a) distinction between scientific studies and test cases difficult
  - b) definition of the goal often wishy-washy
  - c) „scientific“ vs. „conservation“ approach

emerging general recommendations

- define your goal of bioindication precisely
- use an appropriate number of sites (sample size)
- record environmental information
- use available biological information, but choose these carefully
  - a) do not correlate habitat preferences and habitat data
  - b) look for general principles: e.g. „grasslands harbour more generalists than other habitats“, „woodland species are bigger than grassland species“

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some promising (interesting) approaches

subjective!

- comparison of observed and predicted species (Syrph the Net)
- direct correlation of environmental information and life history traits
- functional (ecological) groups

establish syrphids as bioindicators!

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