



**Distribution of the genus *Culicoides* (Diptera: Ceratopogonidae)
along the Scheldt and its tributaries in Flanders with special attention
for the pest species *Culicoides riethi***

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Introduction

Culicoides or biting midges are worldwide best known as vector of viruses pathogenic for various mammals. They can also transmit roundworms and protozoa in birds, humans and other animals. The females of *Culicoides* species suck blood from warm-blooded animals. As they often occur in swarms, they can be a nuisance to humans, especially for people that react allergic to their bites. Despite their importance, little is yet known about the biology and ecology for the majority of the species. They are moreover often difficult to distinguish based solely on morphological traits such that molecular identification tools are recommended.

This master proof was part of the ongoing project "MODIRISK (2007-2011): Mosquito vectors of disease: spatial biodiversity, drivers of change and risk" (www.modirisk.be). Emphasis was on the distribution of the genus *Culicoides* along the Sea and Upper Scheldt. A detailed study investigated the biology and ecology of the species *Culicoides riethi* KIEFFER, 1914, which recently caused severe annoyance in Gentbrugge (VERSTEIRT *et al.*, 2009). Furthermore an experiment with *Forcipomyia* sp., related to

Culicoides, has been implemented.

Within this context the following research goals were addressed: (1) Exploration of the *Culicoides* diversity and species distribution patterns in the region of the Sea and Upper Scheldt and its tributaries to gain a better understanding based on the collected data and literature; (2) Getting insight in the biology and lifestyle of the nuisance species *C. riethi* in Gentbrugge, with the purpose of highlighting measures to reduce its nuisance; (3) Analysis of the efficiency of the two traps used, the Mosquito magnet Liberty Plus (MMLP) and the CDC light trap by experimental design.

Results and discussion

A total of 1244 *Culicoides* were counted in the 85 examined MODIRISK samples located along the Sea- and Upper Scheldt. 17 of the 45 *Culicoides* species recorded until now in Belgium (DEBLAUWE *et al.*, 2009) were found in the MMLP catches during the period 2007-2008.

The following species were most abundant: *Culicoides chiopterus* (MEIGEN, 1830), *Culicoides dewulfi* GOETHGEBUER, 1936, *C. riethi*, *Culicoides obsoletus* (MEIGEN, 1818) /

Culicoides scoticus DOWNES & CATTLE, 1952 complex and *Culicoides punctatus* (MEIGEN, 1804). The subgenus *Avaritia*, with the following 4 species: *C. chiopterus*, *C. obsoletus*, *C. scoticus* and *C. dewulfi*, was captured most frequently. Moreover *C. chiopterus* and *C. obsoletus-scoticus* complex often appeared to be at the same site; whilst *C. riethi* and *C. obsoletus-scoticus*-complex were rarely found together.

The MMLP appeared to be an effective system for trapping *Culicoides*, with females being caught in higher densities than males.

Concerning the nuisance causing species in Gentbrugge, identification of specimens revealed that it belongs to the species *C. riethi*. This species belongs to the subgenus *Monoculicoides*. Already between 1920-1930 this species was present in Hamme along the Durme (specimens present in the KBIN collection of Goetghebuer). Literature search revealed that this species is yet present for a long time in and around the Sea Scheldt and its tributaries.

Further research showed higher densities of *C. riethi* closer to the Sea Scheldt. There were however also remarkably high populations more than 100 meters away from the Sea Scheldt. A clear reason for this observed pattern could not yet be given.

During the inventory, *C. riethi* was caught with two different trapping systems.

Compared to the CDC light trap, the MMLP caught four times more *C. riethi* during the peak flight activity of the species. Both trapping systems collected mainly female *C. riethi*.

C. riethi clearly showed an activity peak during dawn and smaller peaks during dusk.

Based on the two larval studies of *C. riethi*, it is indicated that the larvae of *C. riethi* occur in locally high concentrations.

A major conclusion from this thesis is that more research on the biology and habitat requirements of this species is necessary to provide insight and solutions to reduce the nuisance in Gentbrugge.

Results in the larval experiment with *Forcipomyia* sp. under different treatments indicate that this species does not hatch after a treatment of 15 days submerged. This in contrast to the reference treatment and a submergence treatment of 6 days where a large number of larvae hatched. However, even in the dry treatment some individuals of *Forcipomyia* sp. were able to hatch. Also we found a positive correlation between the organic matter and the amount of hatched *Forcipomyia* sp.

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