

Abstract



## Comparing Different Larval Food Sources and Temperature Regimes for the Rearing of *Culicoides obsoletus/scoticus* Complex Midges, the Predominant Bluetongue, and Schmallenberg Virus Vectors in Northern Europe <sup>+</sup>

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Abstract: During the last decade, Europe was confronted with the emergence of two Culicoidesborne viruses, bluetongue virus and Schmallenberg virus. Both diseases caused economic losses in cattle, sheep, and goats. Despite their importance, only limited knowledge is available on the developmental stages of Culicoides obsoletus complex midges, and a lab-reared colony has not yet been established. Therefore, this experimental study aims to compare the emergence patterns from field-collected C. obsoletus complex from egg to adult that were exposed to different combinations of temperature and larval substrates (T1: 1% liquid broth (LB) agar at 24 °C; T2: 1% LB agar with dung patches at 24 °C; T3: 1% LB agar at 28 °C). The rearing dishes were kept in an environmental chamber under an 8 h/16 h dark-light regime and 80%-85% humidity. Algae and nematodes were provided as a food source. The average period required to develop from egg to adult was 24 days and varied strongly in each of the conditions (T1: 15-47 days; T2: 14-35 days; T3: 20-37 days). A bias of sex ratio was observed towards the production of males in all three treatments with only 23.9% (T1), 23.5% (T2), and 0% (T3) females. Larval mortality was highest in T3 (25.9%), followed by T2 (8.6%), and T1 (1.8%). All pupae produced adults within 1 to 10 days, and the emergence rates for pupae varied strongly between treatments: 49.5% (T1), 71.6% (T2), and 38.5% (T3). This study shows that the C. obsoletus complex can be reared under laboratory conditions from blood-fed, wild-caught females to emerged progeny. More larval substrates and food sources should be tested with the aim of obtaining a 1:1 sex ratio to bring us one step closer to a viable lab-reared colony.

**Keywords:** Culicoides obsoletus s.l.; development lifecycle; oviposition; vector; emergence; arbovirus; artificial blood feeding



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