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Laboratory oviposition studies of *Culicoides* species (Diptera: Ceratopogonidae) associated with orbivirus transmission in the US

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Statement of the problem: *Culicoides* insects (biting midges or no-see-ums) transmit pathogens such as bluetongue virus and epizootic hemorrhagic disease virus to ruminants, exerting a significant economic impact on animal agriculture in the US and other parts of the world. However, very little information exists on various fundamental biological aspects of *Culicoides* species complicating the implementation of effective midge management strategies. In this study, we examined the attractiveness of various natural sources on the oviposition of *Culicoides insignis* Lutz and *C. stellifer* Coquillett (confirmed/suspected vectors of BTV/EHDV particularly in southeastern US) under laboratory conditions.

Methodology: *Culicoides insignis* and *C. stellifer* females were collected from the field using CO₂ baited-CDC UV-light traps. Midges were blood-fed on live chicken and were allowed to oviposit on substrates containing mud or vegetation from a breeding site against a control of moist cotton (two-choice tests).

Findings: Overall, a high proportion of midges (both species) ($\geq 75.0\%$) preferred to oviposit on substrates with breeding site mud or vegetation over control substrates. *C. stellifer* deposited significantly high number of eggs on substrates containing breeding site mud (40.7 ± 14.2) (mean \pm SEM) and vegetation (38.2 ± 9.5) than control substrates (≤ 5.8). The proportion of egg batch deposited by individual females was significantly high during trials with breeding site vegetation ($100.00 \pm 0.00\%$) than with mud ($57.9 \pm 13.2\%$). Similarly, *C. insignis* deposited greater number of eggs on substrates with breeding site mud (48.8 ± 15.0) than control substrates (16.5 ± 6.6). Further experiments are in progress.

Conclusions and significance: A variety of volatile and/or contact cues emanating from different sources in the habitat serve as oviposition attractants/stimulants in *Culicoides* species. A better understanding of *Culicoides* oviposition preferences/cues may lead to development of novel midge control strategies by targeting gravid females and/or better midge survey methods.

Biography

Dinesh Erram, PhD, focuses on understanding various biological aspects of arthropods of medical and/or veterinary importance with an aim to design/improve integrated management strategies against target species. Hemorrhagic disease in ruminants is a significant threat to animal agriculture in the US and other parts of the world. This disease is caused by orbiviruses, which are transmitted by *Culicoides* insects commonly referred to as biting midges or no-see-ums. Unfortunately, effective midge control strategies do not exist currently. Our ongoing research on the oviposition of *C. insignis* and *C. stellifer* provides the first insight into oviposition preferences and potential cues involved in oviposition site selection in these species, which may in the long run provide clues towards their control by potentially targeting gravid females and/or larvae.

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