

Moon phase effect on mosquito vectors of West Nile virus in Madagascar: biodiversity, abundance, host attractiveness and feeding rates

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Abstract:

West Nile Virus (WNV) infection occurs throughout Madagascar. Its epidemiological cycle involves horses, human, birds and mosquitoes. Our entomological data shows unexpected information on mosquitoes vectors diversity and biology that relates to the collection methods. This study highlights the effect of lunar cycle that has not been previously considered in previous studies in Madagascar. During 2017, the influence of the two lunar phases (full *versus* new moon) on mosquito populations was analyzed in a farm located in the surroundings of Antananarivo city, Madagascar. Each month, mosquito collections were performed twice: one night during the full moon and one during the new moon. Six light traps were used: three indoors (in horse's box stall, in a house, in a cowshed), while three outdoors (near a pigsty, near a chicken coop, near a water point). During 24 night catches, 36,448 specimens belonging to 23 species were collected with *Culex antennatus* (64%) and *Cx. quinquefasciatus* (30%) the most abundant species. *Cx. antennatus* was mostly collected in traps associated with domestic animals while *Cx. quinquefasciatus* in trap placed in house. Each month, the total number of females caught during new moon was 1 to 3,5 times higher than those caught during full moon (ANOVA; $F=34.4$, $DF=3$, $P<0,05$). Larger numbers of mosquitoes, driven mainly by *Cx. antennatus*, were collected during the new moon in the three outdoor traps; and inversely during the full moon in the cowshed. This new moon effect was observed in the house but driven mainly by *Cx. quinquefasciatus*. Lunar phase did not influence the abundance of mosquitoes in horse's box stall and the variation of mosquitos' diversity. The total number of fed and unfed females followed ($F=0.709$, $DF=39$, $P>0,05$) the same pattern than the abundance of mosquitoes collected in the farm. The lunar cycle has an effect on mosquito abundance and host attractiveness and might vary according to the mosquito species. This lunar effect and the location of traps should be taken into consideration for one target species during entomological investigations aiming at unraveling West-Nile virus transmission when using light traps.

ASTMH 67th Annual Meeting

October 28 - November 1, 2018

Sheraton New Orleans and New Orleans Marriott

New Orleans, Louisiana USA