Diel activity patterns of mosquitoes in a West Nile Virus circulation area of north-eastern Italy

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Introduction

In the area of Italy surrounding the Po river delta, an outbreak of West Nile virus (WNV), an arthropod borne virus belonging to the family Flaviviridae, genus Flavivirus, is ongoing since 2008. In Veneto region (north-eastern Italy), an entomological survey on WN was put in place since 2009. In a selected site (Fig. 1), sampling was carried out during a 24 h period. The aim of this study was to obtain information on phenology of mosquitoes population and particularly to assess the variation of mosquitoes activity during the day, which is related to the risk of human bite and WNV transmission.

Materials and methods

Sampling was carried out from May to October 2010 fortnightly, using CDC-CO_2 and Gravid Traps (Fig. 2). Each trap was active for 24 h and specimens were collected every two hours. Climatic data were recorded at each intervals of 2 h and from nearest meteorological station for the whole period of monitoring.

Fig. 2 – Mosquito Traps used: A) CDC-CO_2; B) Gravid Trap

Results

Overall, 5780 mosquitoes of six species were collected. The majority of mosquitoes were represented by *Culex pipiens* L. (75%), *Ochlerotatus caspius* (Pallas) (15%), *Aedes vexans* (Meigen) (7%) and *Anopheles maculipennis* (Meigen) (3%) (Fig. 3). CDC-CO_2 trap collected 93% of mosquitoes. The seasonal distribution of the main species *Cx. pipiens* showed a density peak across June-July both by CDC-CO_2 and by Gravid Trap (Fig. 5).

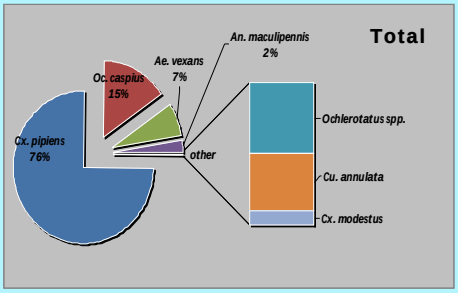


Fig. 3 – Rate (%) of mosquitoes species caught by CDC-CO_2 , Gravid Trap and in total.

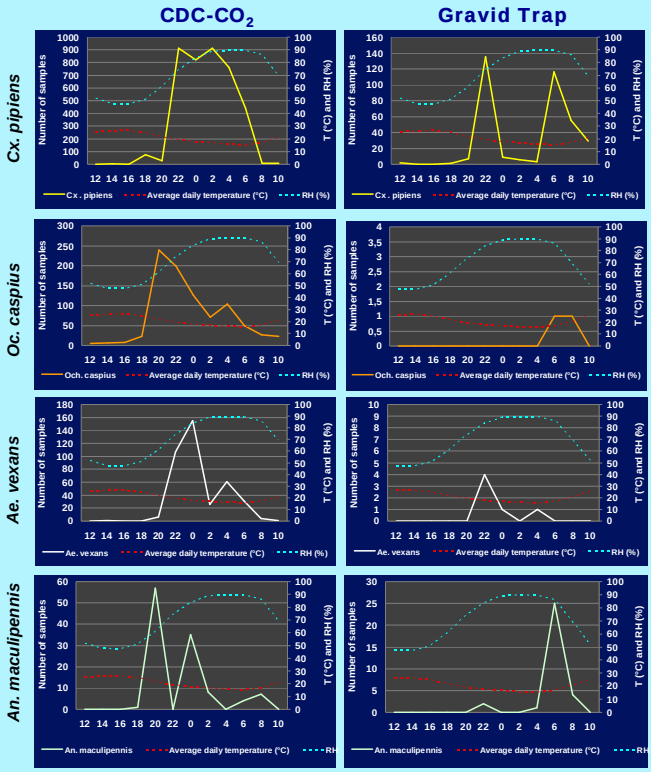


Fig. 4 – Diel activity pattern of the main species related to temperature and relative humidity in each trap (CDC-CO_2 and Gravid Trap).

Cx pipiens caught by CDC-CO_2 trap (feeding activity) were mainly active during 22:00-6:00 h period (97%), and only 93 specimens (3%) were collected during the daylight. *Ae. vexans* was trapped mainly at night, while *Oc. caspius* at each interval. *An. maculipennis* showed twilight feeding activity (110 specimens collected by CDC-CO_2) and laid early in the morning (caught by Gravid Trap) (Fig. 4).

Mosquitoes caught by Gravid Trap (oviposition activity) showed two density peaks at 22:00 (37%) and 6:00 (32%) intervals. This trap collected the 23% of *Cx. pipiens* at 8.00 and at 10.00.

Conclusions

Feeding activity was found during all the darkness period for each mosquito species and this suggests that humans are at risk of being bitten at any time of the night. *Cx. pipiens*, the main vector of WNV, is the species more represented and therefore the major risk of transmission for humans is between 22:00 and 6:00 h. A low risk exists during the daylight too.

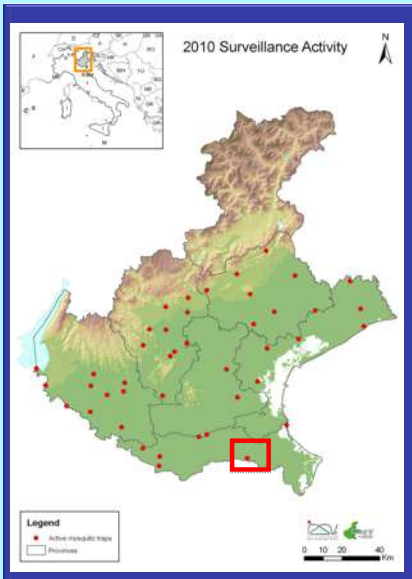
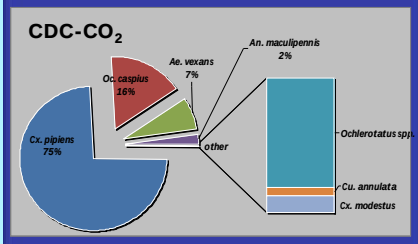
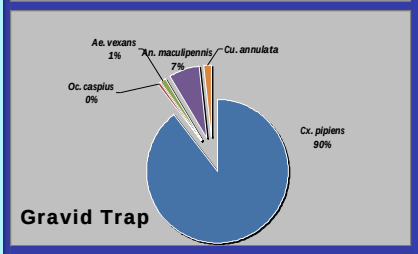


Fig. 1 – Veneto Region and selected site (in the red square) for this study (Papozze –Rovigo province).





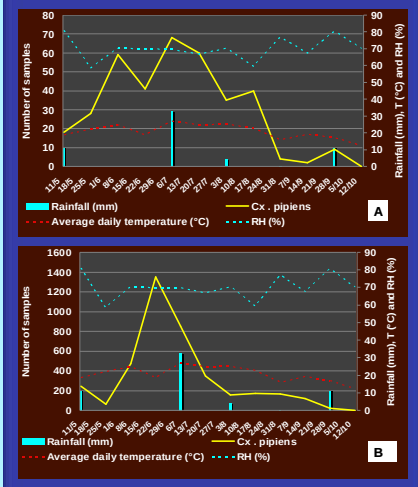


Fig. 5 – Seasonal distribution of *Cx. pipiens* collected by CDC-CO_2 Trap (A) and Gravid Trap (B).