

VALIDATION OF CO₂ TRAP DATA IN THREE EUROPEAN REGIONS

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Abstract - CDC traps are employed as an efficient tool in monitoring mosquito population changes, evaluation of climatic and human made changes on species abundance and composition as well as for estimation of success of control programs. Despite the great advantage in labor saving and sampling the species which are slightly or not attracted to man, compared to classical human bite sampling, usage of traps is constrained to the districts which can provide technical support, gaseous CO₂ or dry ice. The sampling efficacy and accuracy depend on many factors such as: the mosquito species, the weather conditions, the terrain features, the trap construction, the trap site selection, the height of trap position, the amount of CO₂ release and the sucking power, although several other elements could play an important role as well. Several attempts have been made to produce results of trap catches less variable on the site, more uniform at different sites and more reliable in practical application. In Germany females of *Ae. vexans* dominated between at ground level whereas at the height of 10 m *Cx. pipiens* was by far the most abundant species. In urban conditions, *Cx. pipiens* fly up to the level of 45 m. *Ae. vexans* actively migrates 1-2 km per night while, snow-melt mosquitoes migrate less than 2 kilometers during adult life. In Italy the mosquito nuisance would be considered intolerable with over 30 females of *Aedes*/trap/night or 200 females of *Culex*/trap/night. Our investigation demonstrated that *Ae. geniculatus*, *Ae. sticticus* and *An. plumbeus* were attracted more by human bait than by carbon dioxide. There was no significant differences between both numbers and species of mosquitoes caught by CO₂ + light and by CO₂ alone.

Key words - Mosquitoes, CO₂, dispersal, distribution, tolerance

INTRODUCTION

Most European countries with developed mosquito control programs, include in their monitoring systems CO₂ baited traps which give more confidence in making qualitative and quantitative investigations of the mosquito fauna. The precise knowledge of the biology of the mosquito species in question, as well as their relative abundance and phenology is inalienable to fulfill the requirements of an economical and ecological successful treatment. Thus a monitoring program for adult mosquitoes serves to achieve important data about the species composition, abundance and phenology (population dynamics), the spatial and temporal distribution related to migration, the tolerance threshold as a basis for the needs of mosquito control activity, the reduction of the mosquito population after control operations and the effect of various visual and olfactory stimuli on mosquitoes. The monitoring of the adult mosquito population can be efficiently conducted by CO₂ baited light traps which could be modified to fulfil the specific needs of each study. CO₂ traps were engaged in the investigations of mosquito ecology and biting behavior in Yugoslavia in 1983, and for both scientific and regular monitoring purposes in Italy and Germany since the beginning of the 1990's. In the recent years they were also accepted as a regular monitoring tool by the mosquito abatement districts in Spain and in some other countries.

Control programs aimed at reduction of primarily nuisance mosquitoes ought to be conducted on the basis of appropriate cost/benefit evaluation considering that mosquito density reduction is basically subject to the principle of decreasing productivity per unit of economic investment. In the Upper Rhine Valley dispersion of snow melt and floodwater mosquitoes, the effect of temperature changes on sampling size and vertical distribution of different species have been determined. According to the trapping data in Italy, threshold number of mosquitoes requiring control has been established too. Depending on the results obtained by CO₂ traps in Yugoslavia, some aspects of blood searching behavior have been verified, control strategies developed and justified.